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(54) **METHOD OF ATOMIC TRANSFORMATION**

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(57) **ABSTRACT**

This invention provides a method for atomic transformations carried out under conditions akin to chemical catalysis. Liquid and solid state catalysts are used in a two-step process. We have found that the high ionic/electric activity of concentrated sodium hydroxide solution in combination with heating is sufficient to induce atomic transformation and provide a solid phase catalyst of high aluminum and silicon content. This product when heated at a temperature of 1000° C. yields numerous elements of higher atomic masses. Thus, atomic transformation (transmutation) is demonstrated by using common chemicals and simple laboratory procedures

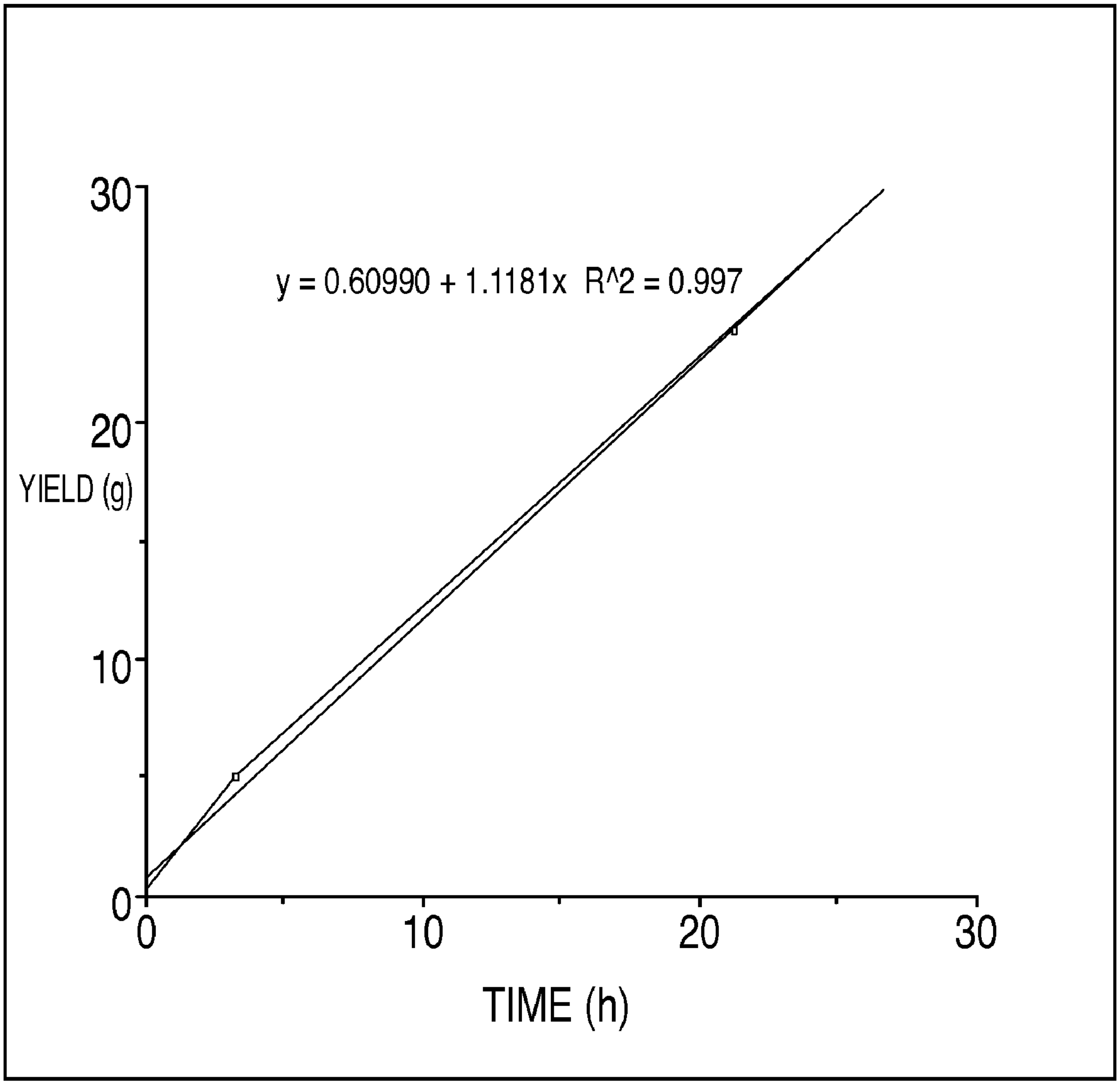
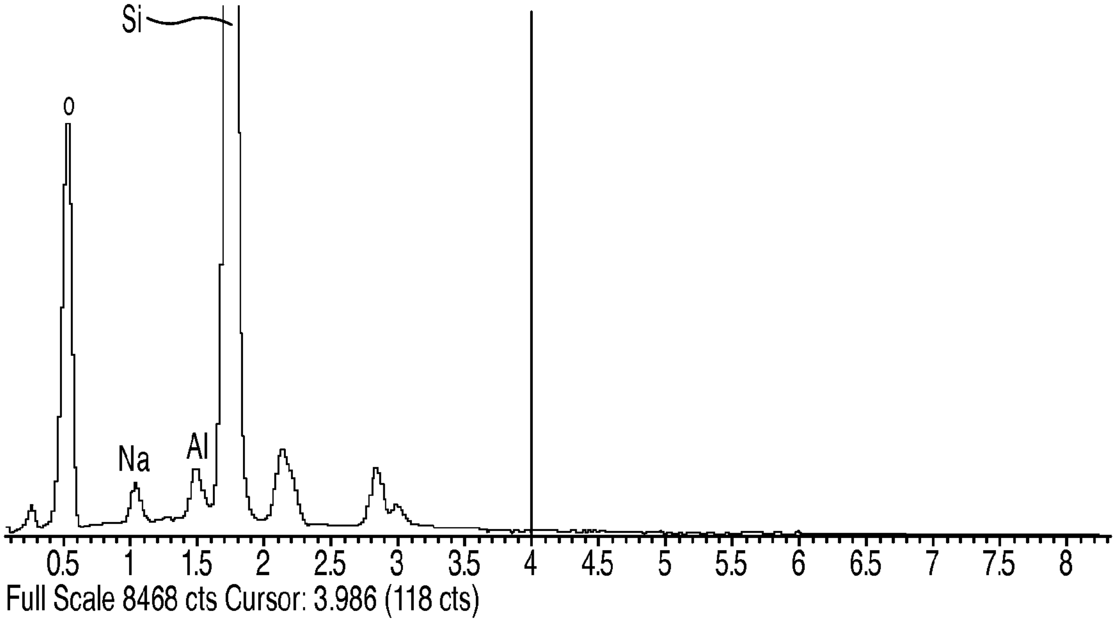


FIG. 1

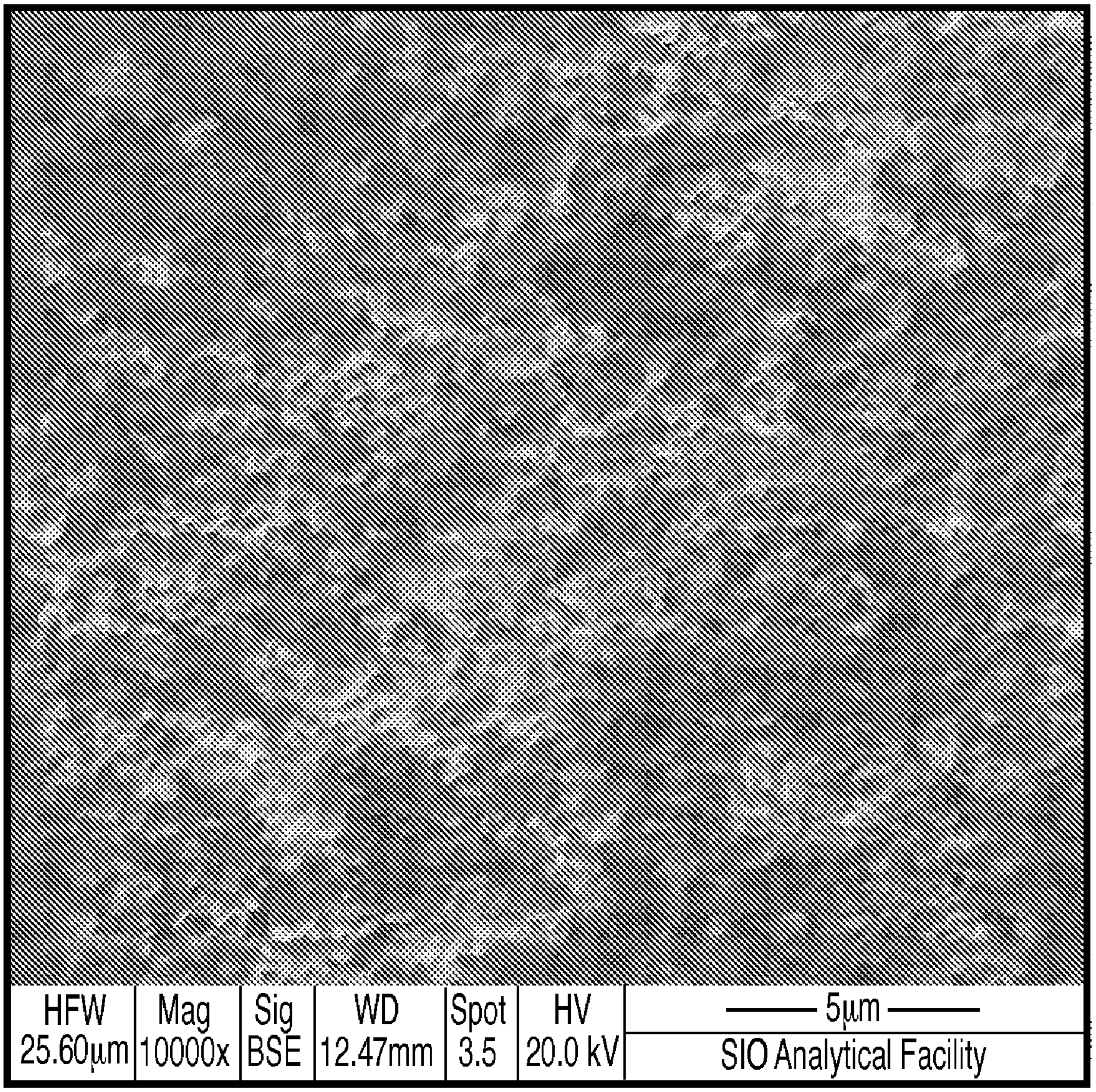


Spectrum processing:
Peaks possibly omitted : 2.147, 6.291, 9.703, 11.474, 13.360 keV

Processing option : All elements analyzed (Normalised)
Number of iterations = 4

Element	App Conc.	Intensity Corrn.	Weight%	Weight% Sigma	Atomic%
O K	45.22	0.9876	54.26	0.33	67.27
Na K	1.77	0.8753	2.40	0.12	2.07
Al K	1.21	0.8935	1.61	0.09	1.18
Si K	32.96	0.9362	41.74	0.30	29.48
Totals			100.00		

FIG. 2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Mag
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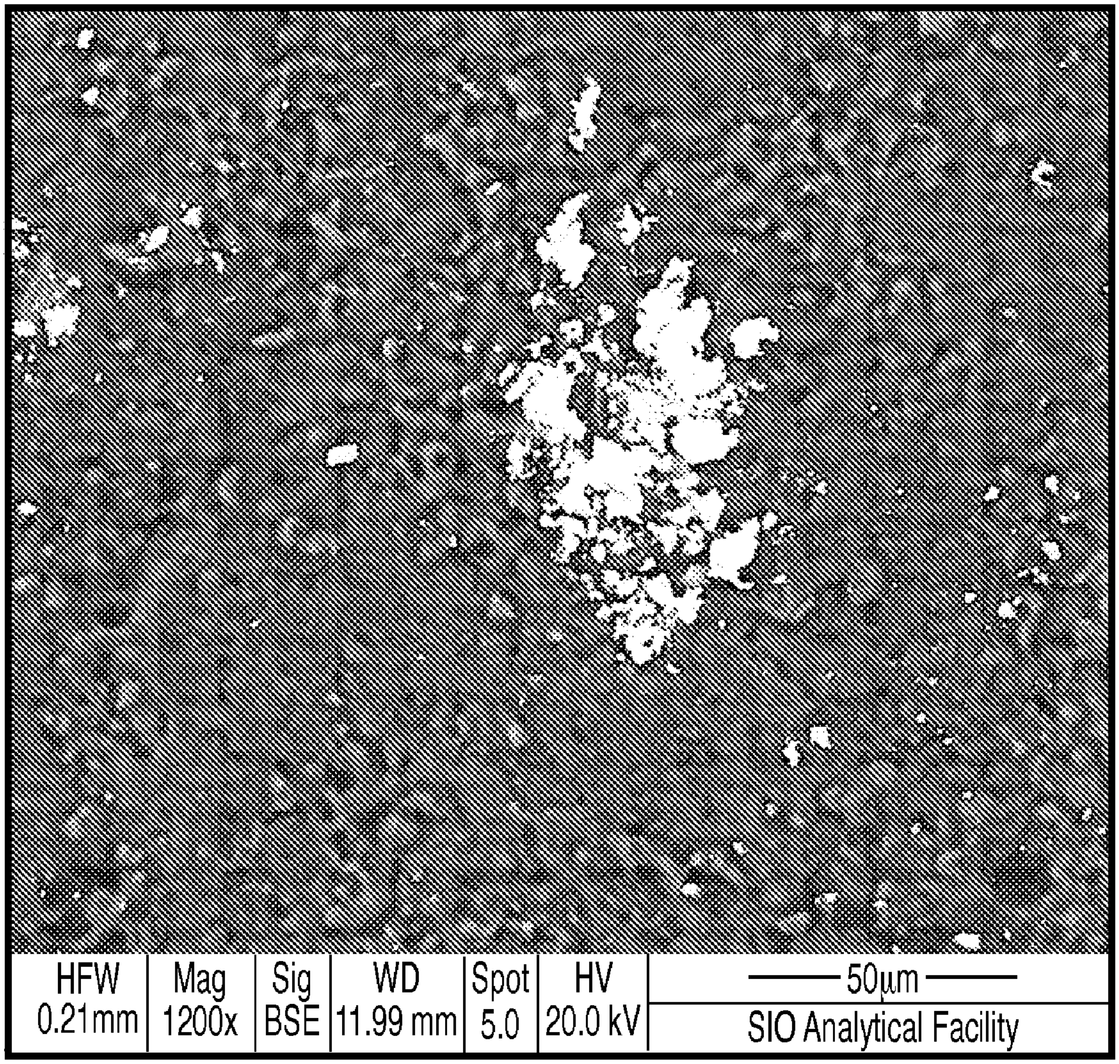
Sig
BSE
WD
12.47mm
Spot
3.5
HV
20.0 kV
5µm
SIO Analytical Facility

FIG. 3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Spot
5.0
HV
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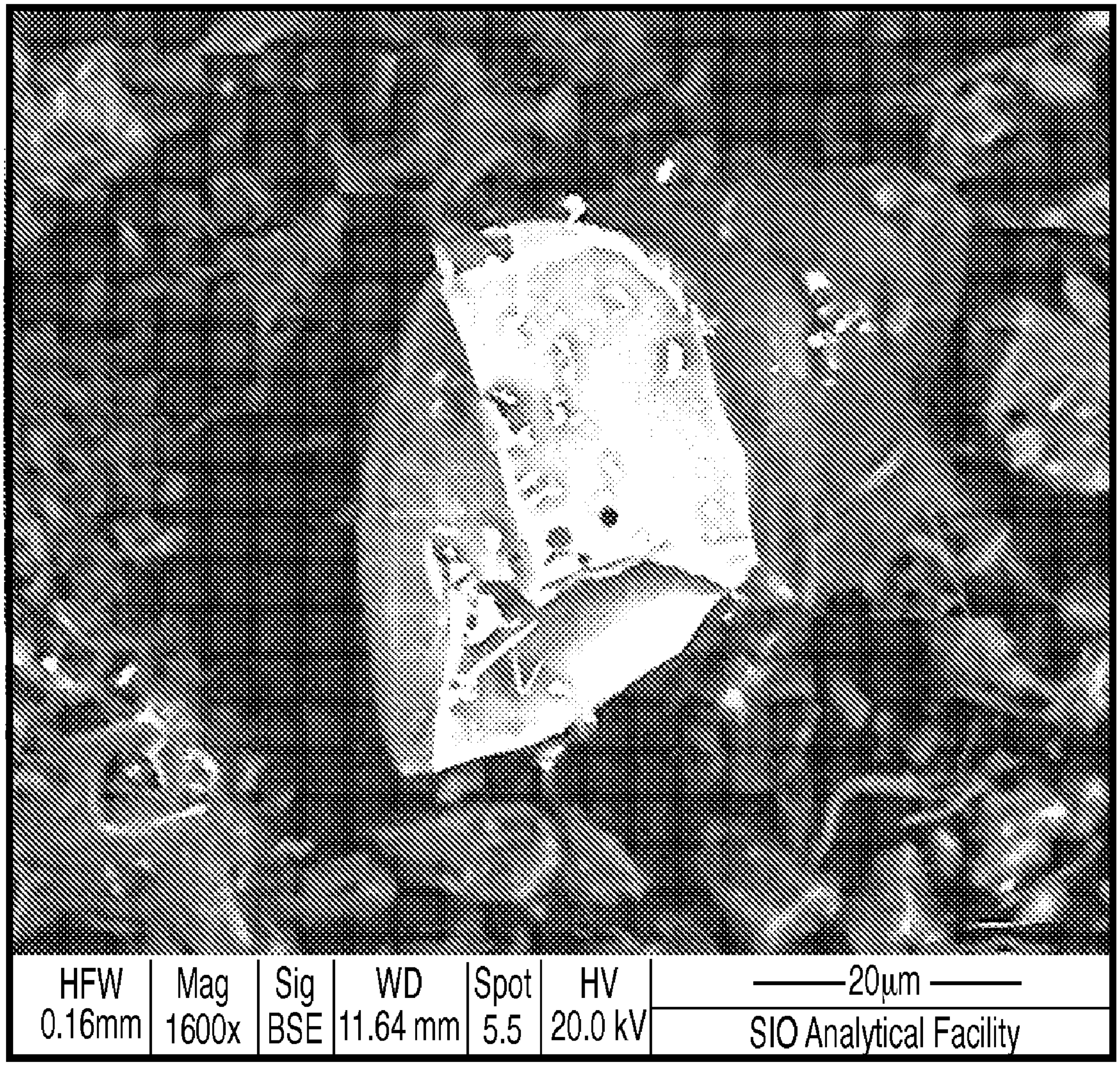
SIO Analytical Facility

FIG. 4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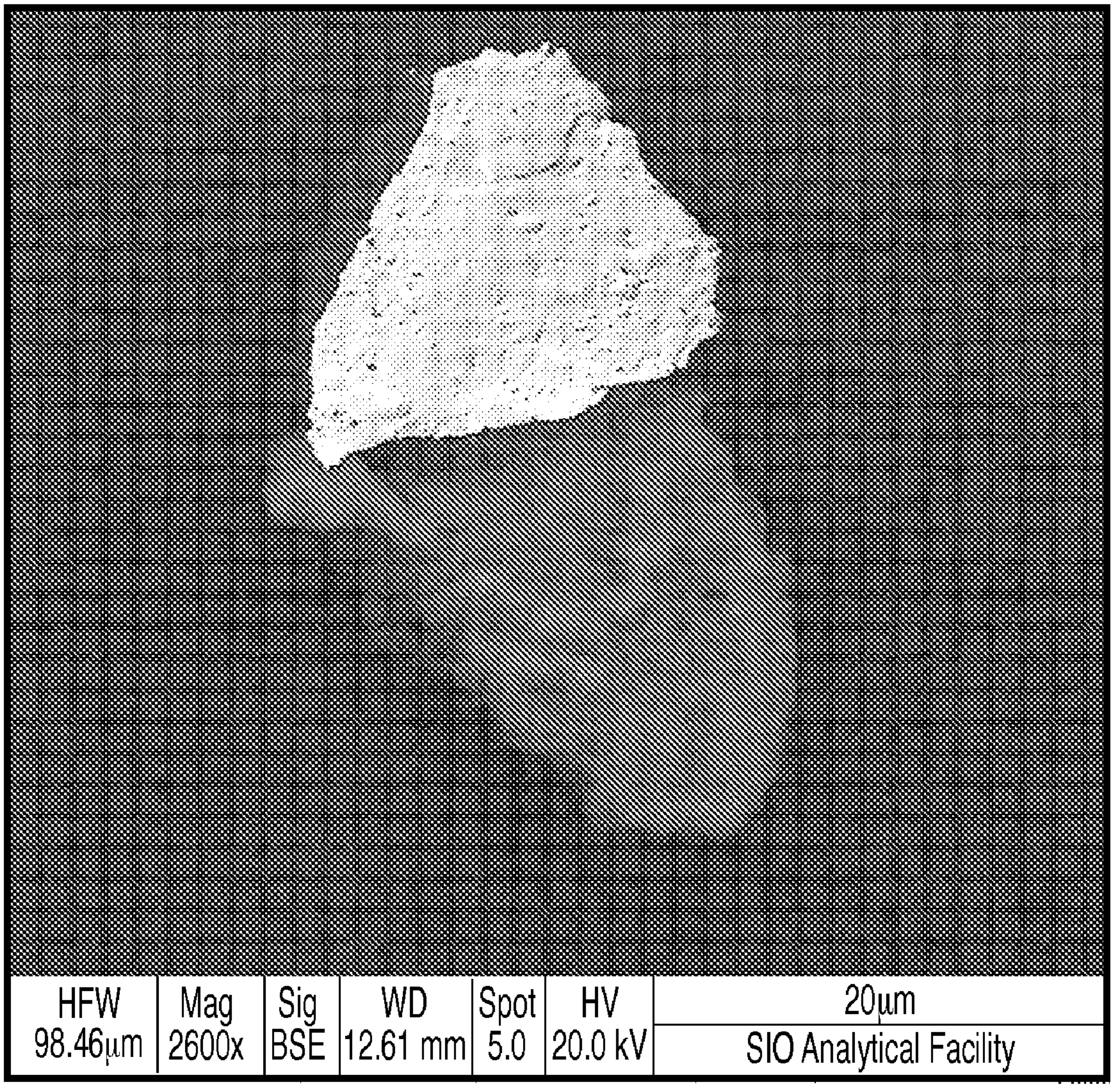
SIO Analytical Facility

FIG. 5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98.46μm
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Sig
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Spot
5.0
HV
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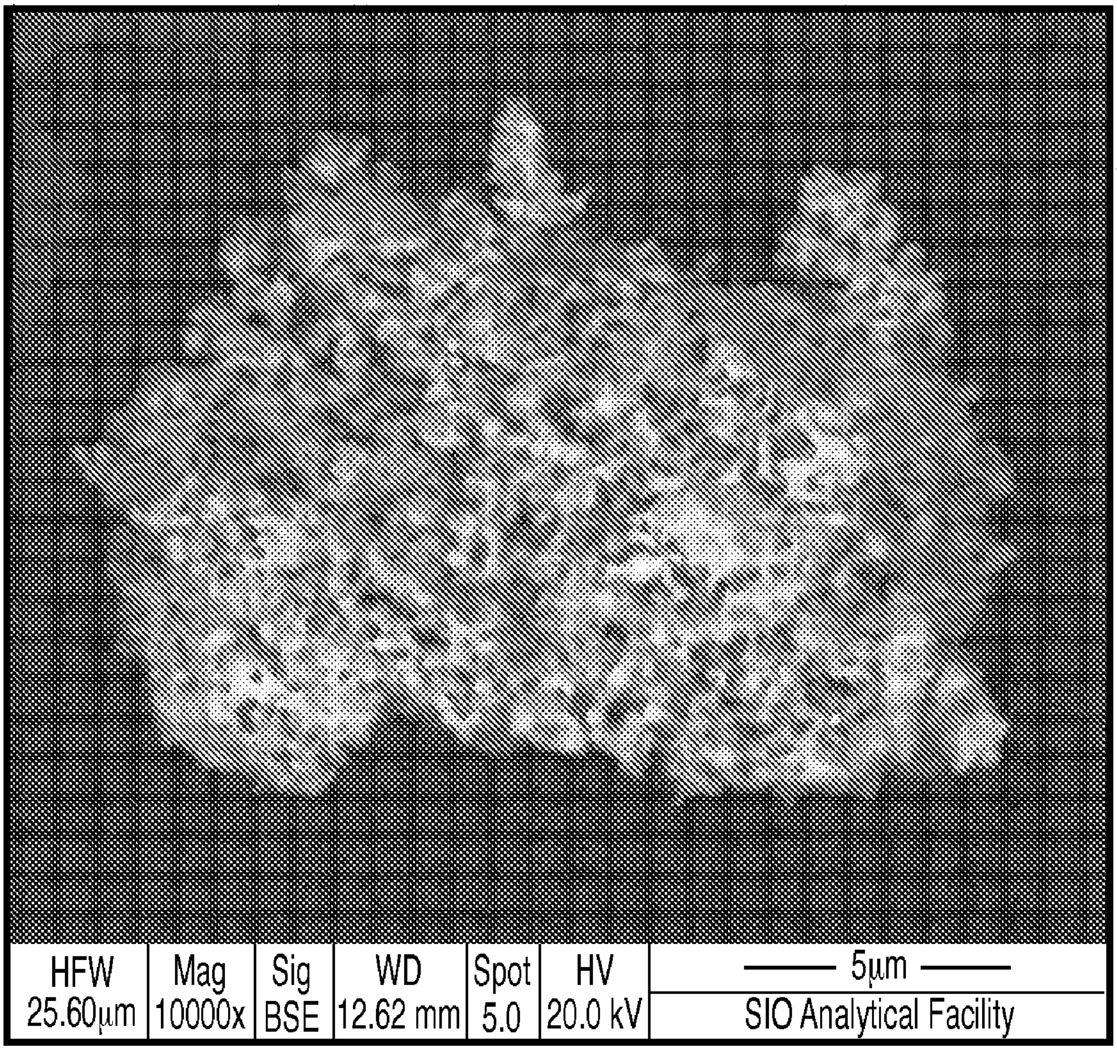
SIO Analytical Facility

FIG. 6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25.60μm
Mag
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Sig
BSE
WD
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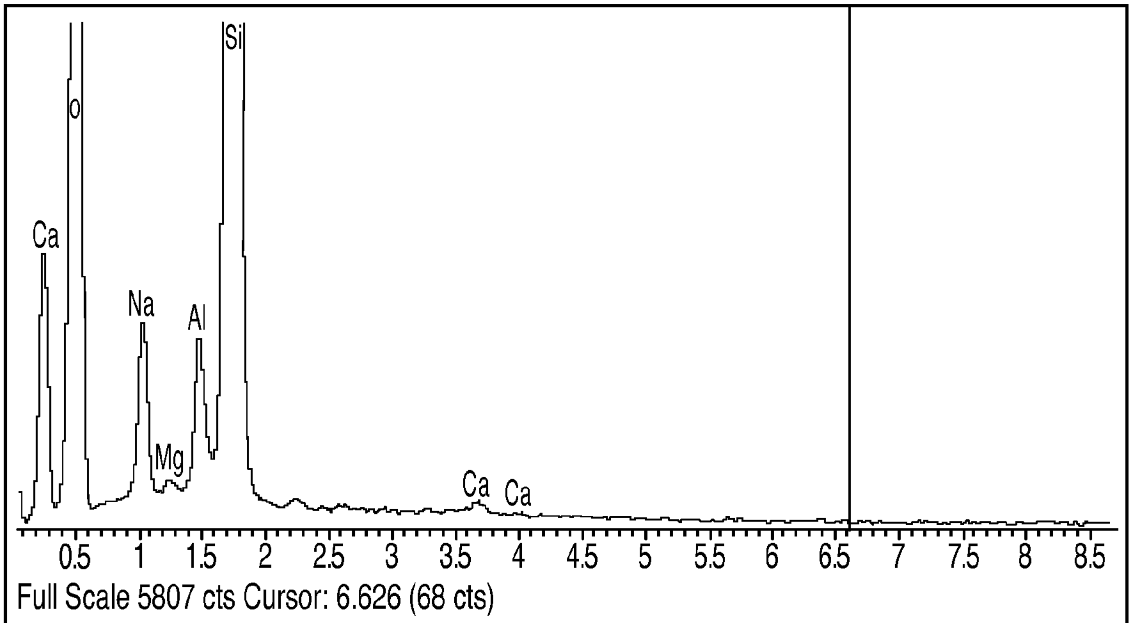
Spot
5.0
HV
20.0 kV
5μm
SIO Analytical Facility

FIG. 7

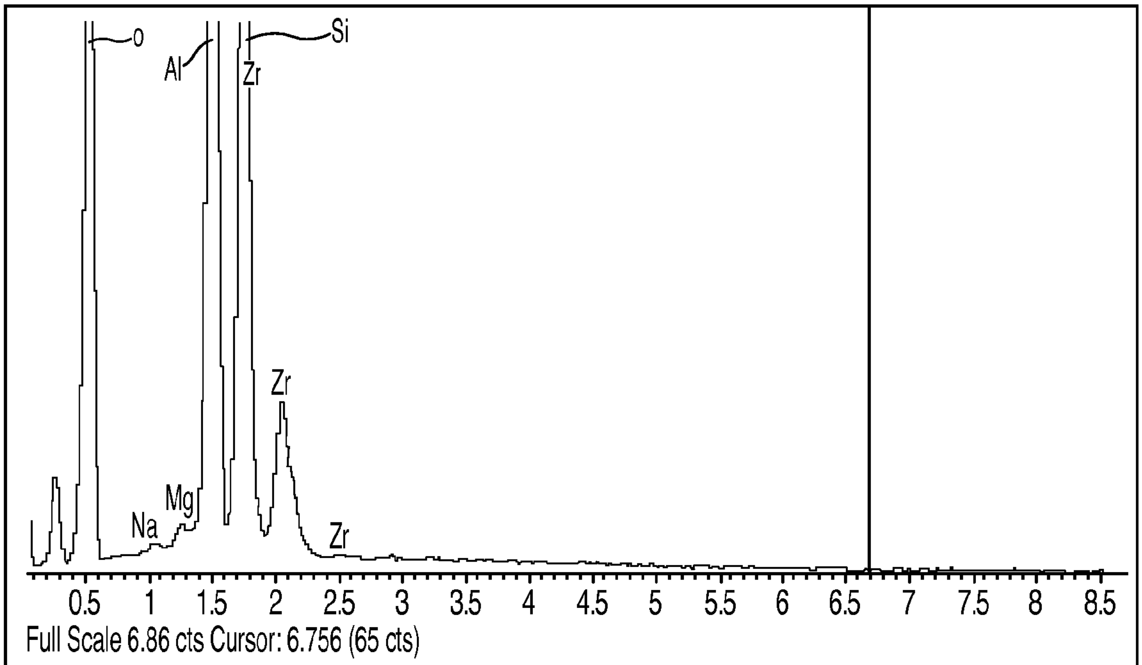


Spectrum processing:
Peaks possibly omitted : 2.254, 2.627, 7.190 keV

Processing option : All elements analyzed (Normalised)
Number if iterations = 4

Element	App Conc.	Intensity Corrn.	Weight%	Weight% Sigma	Atomic%
O K	93.72	1.0681	58.43	0.19	70.78
Na K	4.21	0.8403	3.34	0.08	2.81
Mg K	0.17	0.7433	0.16	0.04	0.12
Al K	1.98	0.8571	1.54	0.05	1.10
Si K	49.68	0.9105	36.34	0.17	25.08
Ca K	0.28	0.9339	0.20	0.03	0.10
Totals			100.00		

FIG. 8

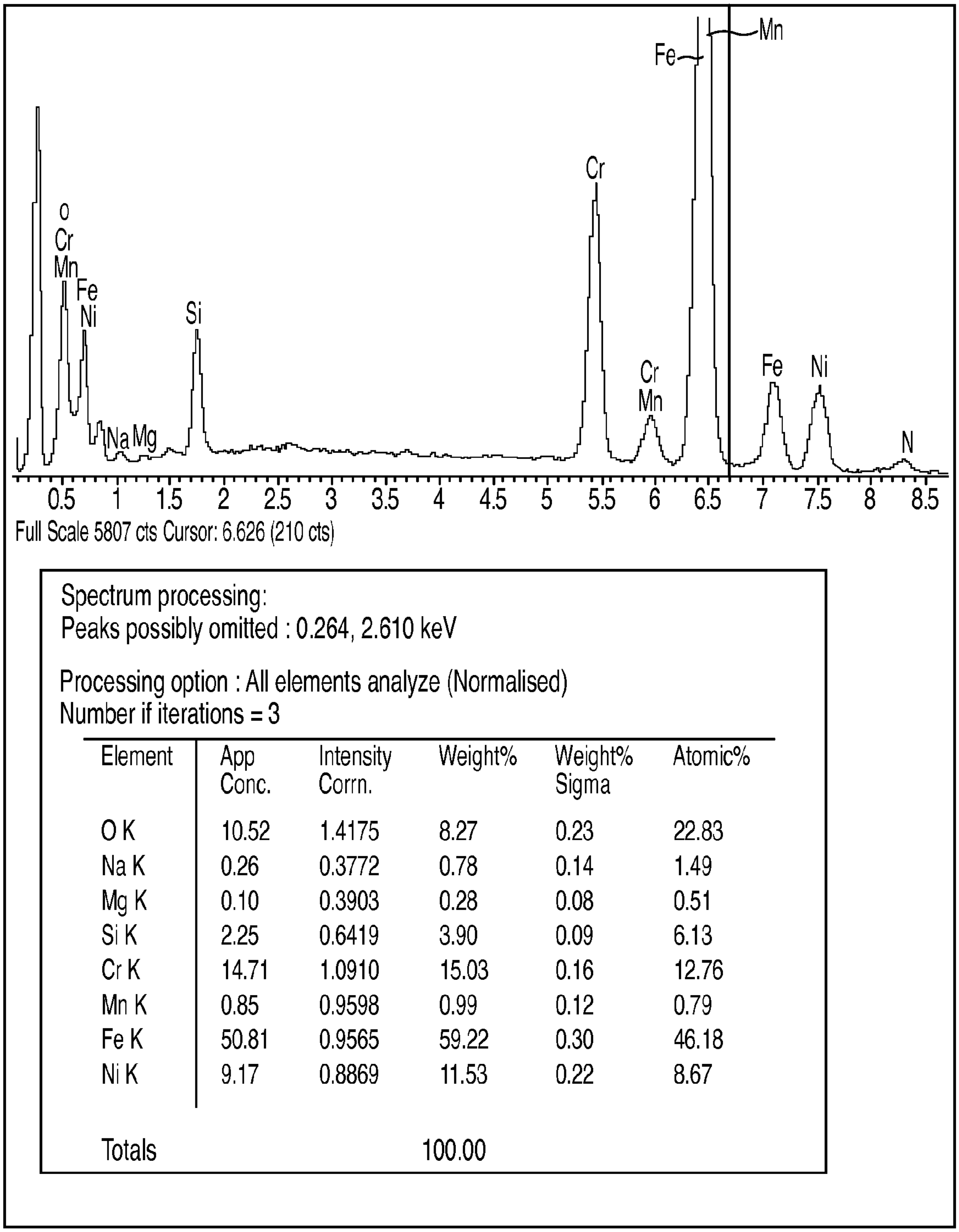


Spectrum processing:
No peaks omitted

Processing option : All elements analyze (Normalised)
Number if iterations = 3

Element	App Conc.	Intensity Corrn.	Weight%	Weight% Sigma	Atomic%
O K	114.98	0.8632	50.14	0.32	66.96
Na K	0.64	0.8857	0.27	0.06	0.25
Mg K	0.68	0.8188	0.31	0.06	0.28
Al K	39.89	0.9169	16.38	0.15	12.97
Si K	47.54	0.7961	22.48	0.19	17.10
Zr L	16.44	0.5942	10.42	0.28	2.44
Totals			100.00		

FIG. 9



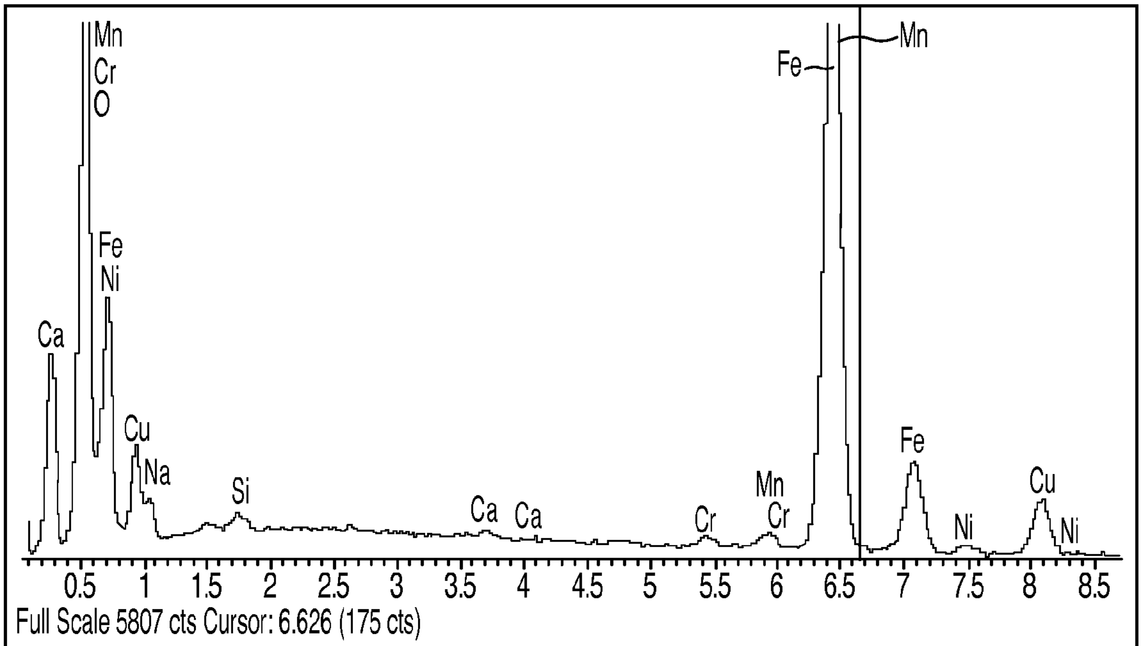
Full Scale 5807 cts Cursor: 6.626 (210 cts)

Spectrum processing:
Peaks possibly omitted : 0.264, 2.610 keV

Processing option : All elements analyze (Normalised)
Number if iterations = 3

Element	App Conc.	Intensity Corrn.	Weight%	Weight% Sigma	Atomic%
O K	10.52	1.4175	8.27	0.23	22.83
Na K	0.26	0.3772	0.78	0.14	1.49
Mg K	0.10	0.3903	0.28	0.08	0.51
Si K	2.25	0.6419	3.90	0.09	6.13
Cr K	14.71	1.0910	15.03	0.16	12.76
Mn K	0.85	0.9598	0.99	0.12	0.79
Fe K	50.81	0.9565	59.22	0.30	46.18
Ni K	9.17	0.8869	11.53	0.22	8.67
Totals			100.00		

FIG. 10A

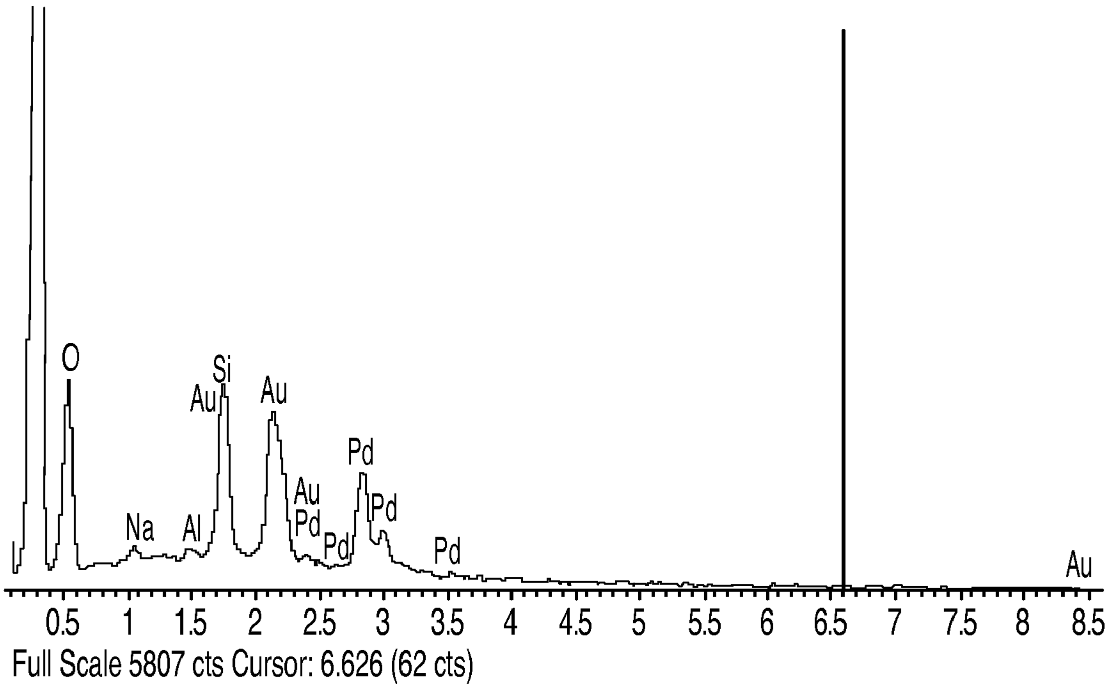


Spectrum processing:
No peaks omitted

Processing option : All elements analyze (Normalised)
Number if iterations = 3

Element	App Conc.	Intensity Corrn.	Weight%	Weight% Sigma	Atomic%
O K	46.80	1.5833	28.67	0.31	57.43
Na K	1.01	0.3964	2.47	0.24	3.44
Si K	0.23	0.6445	0.34	0.07	0.39
Ca K	0.21	1.1025	0.19	0.05	0.15
Cr K	0.48	1.1143	0.42	0.07	0.26
Mn K	0.82	0.9224	0.86	0.09	0.50
Fe K	55.73	0.9448	57.22	0.35	32.83
Ni K	0.92	0.8688	1.03	0.13	0.56
Cu K	7.62	0.8402	8.80	0.23	4.44
Totals			100.00		

FIG. 10B

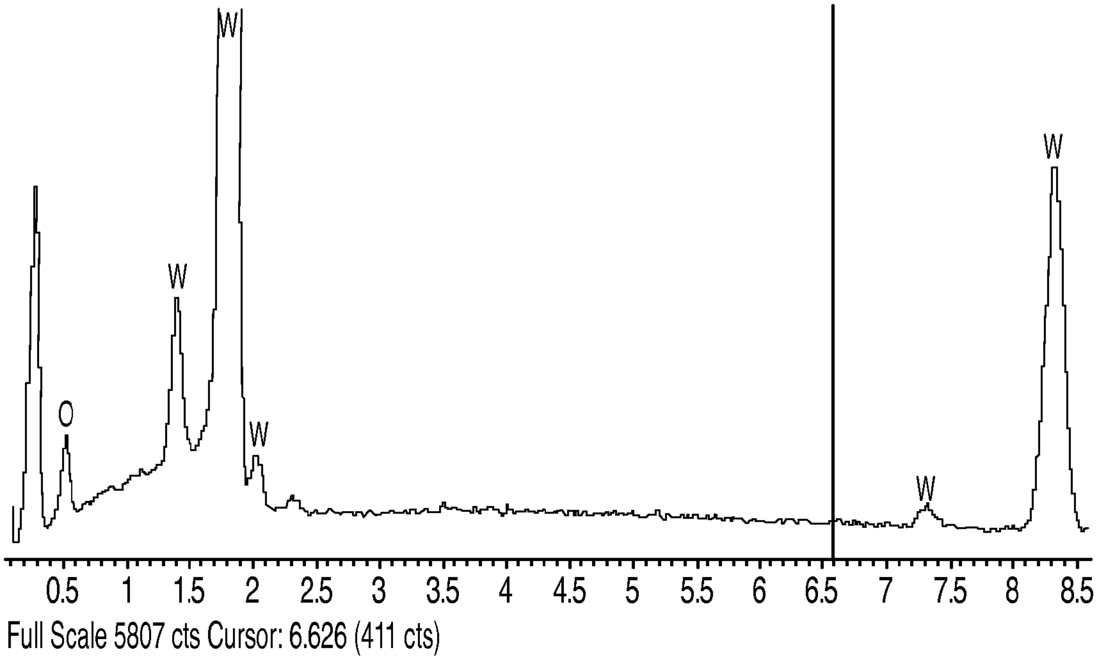


Spectrum processing:
No peaks omitted

Processing option : All elements analyze (Normalised)
Number if iterations = 3

Element	App Conc.	Intensity Corrn.	Weight%	Weight% Sigma	Atomic%
O K	2.56	0.5387	21.81	1.63	59.16
Na K	0.26	0.7987	1.47	0.32	2.78
Al K	0.15	0.8515	0.80	0.18	1.29
Si K	2.36	0.9773	11.10	0.37	17.14
Pd L	4.30	0.6918	28.52	0.95	11.63
Au M	6.40	0.8098	36.29	1.11	7.99
Totals			100.00		

FIG. 11



Spectrum processing:
No peaks omitted

Processing option : All elements analyze (Normalised)
Number if iterations = 5

Element	App Conc.	Intensity Corrn.	Weight%	Weight% Sigma	Atomic%
O K	4.55	0.6666	6.53	0.29	44.52
W M	95.54	0.9783	93.47	0.29	55.48
Totals			100.00		

FIG. 12

METHOD OF ATOMIC TRANSFORMATION

BACKGROUND OF THE INVENTION

[0001] This invention relates to atomic transformation reactions, in particular to the synthesis of magnesium, calcium, aluminum, silicon, iron, nickel, chromium, manganese, copper, silver, gold, palladium, zirconium, tungsten and others. Currently, the conversion of elements into each other is performed in nuclear reactors or utilizing other sources of nuclear radiation. These methods are unsuitable for the low-cost mass production of elements and produce many undesirable radioisotopes. The present invention aims to provide a method allowing low-energy atomic transformations under conditions akin to chemical catalysis.

SUMMARY OF THE INVENTION

[0002] Previously, we have introduced a new model of the atom that predicted that atomic transformations (transmutation) could be carried out under conditions akin to chemical catalysis. This invention provides a proof of this model, using liquid and solid phase catalysts in a two-step process. We have found that the high ionic activity of concentrated sodium hydroxide solution in combination with heating is sufficient to induce atomic transformation and generate a solid phase catalyst of high aluminum and silicon content. This catalyst when heated at a temperature of 1000° C. yields a variety of elements, including magnesium, calcium, iron, nickel, chromium, manganese, palladium, gold, silver, tungsten and copper. Thus, atomic transformation has been demonstrated using common chemicals and simple laboratory procedures.

[0003] Accordingly, one aspect of the present invention is a method of elemental transformation comprising:

[0004] (1) providing a liquid phase catalyst utilizing high ionic/electric energy;

[0005] (2) heating the liquid phase catalyst;

[0006] (3) neutralizing the liquid phase catalyst to prepare a solid phase catalyst;

[0007] (4) performing solid phase catalysis by heating the solid phase catalyst at high temperature; and

[0008] (5) heating the solid phase catalyst with an element or its compound to achieve elemental transformation.

[0009] Another aspect of the present invention is a method of use of a product produced by the method described above in a biological system.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The following invention will become better understood with reference to the specification, appended claims, and accompanying drawings, where:

[0011] FIG. **1** is a graph showing the time-course of the white precipitate formation in the first reaction step.

[0012] FIG. **2** is a graph showing the Scanning Electron Microscopy-Energy Dispersive Spectroscopy (SEM-EDS) analysis of the white precipitate.

[0013] FIG. **3** is a graph showing the SEM image of the white precipitate.

[0014] FIG. **4** is a graph showing the SEM image of the heated white precipitate.

[0015] FIG. **5** is a graph showing the SEM image of crystal **1**.

[0016] FIG. **6** is a graph showing the SEM image of crystal **2**.

[0017] FIG. **7** is a graph showing the SEM image of crystal **3**.

[0018] FIG. **8** is a graph showing the matrix composition of the heated white precipitate.

[0019] FIG. **9** is a graph showing the SEM-EDS analysis of crystal **1**.

[0020] FIG. **10** is a graph showing the SEM-EDS analysis of two areas in FIG. **4**.

[0021] FIG. **11** is a graph showing the SEM-EDS analysis of crystal **2**.

[0022] FIG. **12** is a graph showing the SEM-EDS analysis of crystal **3**.

DETAILED DESCRIPTION OF THE INVENTION

[0023] Over the past two decades, numerous research reports have emerged on low energy nuclear reactions, e.g., the formation of tritium from deuterium on Pd (1), the formation of Fe in gold electrodes, or the formation of helium and cadmium in a Pd electrode (2), as well as the formation of other elements (3). These data were largely viewed with skepticism as low energy nuclear reactions are not explainable within our current understanding of atomic processes.

[0024] We recently introduced a new theory of the atom that provides a theoretical framework for the design of low energy nuclear reactions (4, 5). The theory proposes that atoms are complex electromagnetic waveforms that are circulators of the space lattice, the carrier medium for electromagnetic interactions. We suggested that only electromagnetic energy exists, and therefore electromagnetic pressure waves of sufficient intensity should induce atomic transformation. In addition, the atom should be viewed as a whole, irrespective of whether chemical or nuclear reactions are concerned. For this reason, we introduce here the term low energy atomic transformation to replace the currently used term “nuclear reaction” to describe the synthesis of elements under conditions akin to chemical catalysis.

[0025] We hypothesized that sufficient electric pressure could be generated by utilizing high ionic activities of molecules, a method commonly used in chemical catalysis. We reasoned that a single catalytic step may be enough to produce elements of lower atomic masses, and such a procedure is demonstrated in this invention. The synthesis of elements of higher atomic masses requires an additional catalytic step.

[0026] Accordingly, one aspect of the present invention is a method of elemental transformation comprising:

[0027] (1) providing a liquid phase catalyst utilizing high ionic/electric energy;

[0028] (2) heating the liquid phase catalyst;

[0029] (3) neutralizing the liquid phase catalyst to prepare a solid phase catalyst;

[0030] (4) performing solid phase catalysis by heating the solid phase catalyst at high temperature; and

[0031] (5) heating the solid phase catalyst with an element or its compound to achieve elemental transformation.

[0032] In one alternative, electric pressure is generated in order to facilitate elemental transformation. In another alternative, heating and electric pressure are used in combination.

[0033] The liquid phase catalyst can be a base or an acid.

[0034] Typically, the reaction temperature of the liquid phase catalytic step is between about 80° C. and about 250° C. Typically, the reaction time for the liquid phase catalytic step is from about 5 hours to about 24 hours. Typically, the heating temperature of the liquid phase catalyst is between about 100° C. and about 120° C.

[0035] The neutralization step can yield a solid phase catalyst in the form of a white precipitate. The white precipitate can contain sodium, aluminum, silicon, and oxygen as main constituents. The white precipitate catalyst can be heated at a temperature range of from about 800° C. to about 1700° C., optionally with an element.

[0036] New elements can be generated by the method; for example, the new elements can include at least one element selected from the group consisting of magnesium, aluminum, calcium, palladium, copper, gold, silver, zinc, tungsten, iron, manganese, nickel, zirconium and chromium.

[0037] The synthesized elements produced by the method can have an atomic mass higher than sodium.

[0038] Another aspect of the present invention is a method of use of a product produced by the method described above in a biological system. The biological organism can be a microorganism or a eukaryote, such as a higher plant or a human.

Materials and Methods

[0039] All chemicals were obtained from Sigma-Aldrich and were of ACS grade or equivalent. All containers coming in contact with reaction media were glass. The elemental transformation method described here involves a two-step reaction. In the first step, 4.5 liters of 3.7 M NaOH were gently refluxed for 5-24 h in a round-bottom glass reactor. After cooling to room temperature on a chilled water bath, the pH was adjusted slowly to slightly acidic (pH 4-5) with 1:1 HCl under gentle stirring. The solution became turbid; a white precipitate began to form early in the neutralization process. It is important to avoid significant warming up of the solution. The best approach is to perform the neutralization on a chilled water bath and keep the temperature at around 20° C.

[0040] From the slightly acidic pH, the mixture was readjusted to mildly alkaline by using 1M NaOH solution until pH 8 was reached. After stirring was stopped, the supernatant slowly cleared and a white precipitate settled out. After the precipitate settled overnight the supernatant was carefully aspirated off using a peristaltic pump. The precipitate was re-suspended in 8 L of deionized water and allowed to settle overnight again. The settled precipitate was transferred into 1-L centrifuge tubes with deionized water and spun at 3,500 rpm for 35 m in a Sorvall model RC3B centrifuge. The precipitate was washed 3 more times by resuspension in deionized water to remove residual salts, and spread out on a glass tray to air dry. Subsequently, it was heated at 70° C. for 7 hours to reach a constant weight and weighed. The granular, soft white material was ground to a fine powder in a porcelain mortar and stored in a plastic jar at room temperature. The second catalytic step involved heating the white precipitate to 1000° C. for 1 hr in a Sentrotech STT-1600 tube furnace in an air atmosphere. SEM-EDS analyses were performed using a Philips Quanta 600 instrument.

Results and Discussion

[0041] In a new theory of the atom and atomic processes (4, 5), we proposed that the atom is a complex electromagnetic waveform with constituents that form a balanced, coupled system. We also suggested that the atom should be treated as a whole, regardless of whether chemical or nuclear reactions are concerned. For this reason, we have introduced the term low energy atomic transformation as opposed to the currently used nuclear reaction to describe the synthesis of new elements under conditions similar to chemical catalysis. As the atom is formed out of the space lattice by electromagnetic pressure waves (4, 5), the atom may also be transformed (transmuted) by electromagnetic force alone.

[0042] A large body of evidence is now accumulating on low energy nuclear reactions demonstrating that electromagnetic effects may be sufficient to achieve atomic transformation (1-3). As chemical reactions are electric, we reasoned that the high ionic/electric activity of extreme pH could be sufficient to drive atomic transformation reactions. Heating the reaction mixture amplifies the electric activity of high pH and should thus increase reaction rates.

[0043] To study whether atomic transformation may occur in a heated NaOH solution, we first set up the reflux of a 3.7M NaOH solution for increasing times (FIG. **1**). We also hypothesized that reaction product could become enriched in silicon, because this element resides at wave amplitude of the 5_{th} octave in the spiral periodic table of elements [6] and so it is a potential end product of the transformation of sodium. Therefore, after neutralization with acid, the silicon-rich reaction product should precipitate out. In fact, we found a white precipitate forming early in the neutralization process. No precipitate forms before boiling takes place. For neutralization, we used both acetic and hydrochloric acids and found that HCl neutralization yields a more robust precipitate. Despite this, settling of the precipitate takes a long time and even with centrifugation a small loss of fines occurred. The precipitate was subsequently dried at 70° C. and weighed.

[0044] We also noticed a minor breakdown of the glass material of the reaction vessel, and an average mass loss of 2 g of the reaction flask over a 24 h refluxing. This is only 1/10th of the amount of precipitate obtained during the reaction. In the 5 h reactions, an average weight loss was observed of 0.9 g of the reaction vessel. The average yield of the white precipitate in three reactions was 20.1 g. The amount of precipitate generated in the reaction mixture increased nearly linearly with the boiling time indicating that the reaction potential was not exhausted over 24 h of boiling (FIG. **1**).

[0045] The elemental composition of the white precipitate differs substantially from that of the starting neutralized NaOH as well as the glass material of the reaction vessel. In Table 1, the compositions of the starting neutralized NaOH, the white precipitate and the reactor glass material were compared by ICP-MS. Analysis of the white precipitate by SEM-EDS (FIG. **2**) and ICP-MS (Table 1) demonstrated a high concentration of silicon that was not present in the starting reagents. In fact, the silicon concentration in the HCl neutralized NaOH solution at zero time was merely 1.5 ppm, consistent with ACS grade chemicals. The concentrations of magnesium, aluminum, and calcium were also greatly increased compared with the starting reagents. As 666 g of NaOH yielded 20.1 g of precipitate, a conversion factor of 33.13 can be used to estimate the relative concentration changes of elements.

[0046] The data demonstrate that Mg, Ca, Al and Si appeared (likely in the form of a mixed sodium silicate compound) as the main new constituents during boiling of NaOH. The reactor glass contributes just 8% of the silicon content of the white precipitate. The consumption of Na during reflux was also evident. In addition, the concentration of a number of other elements increased to varying degrees in the white precipitate relative to time zero. Among these, the greatest increases were shown by Cu, Fe, Ti, Mn, Zn and Zr. The concentrations of Al, C, Na, and Si in the samples were confirmed by X-ray fluorescence.

[0047] This observation can be interpreted by our new theory of the atom (4, 5) as well as the theory of spiral periodic table of elements introduced by Russell (6, 7). He suggested that all elements are aggregates of light units progressing through their evolutionary cycle of disappearance and reappearance. In other words, all elements follow a similar life cycle and therefore "stable" elements do not exist. According to Russell, all elements of matter are positioned along a nine-octave sine wave cycle of motion. Each octave has 7 tones (elements) plus a "supertone" noble gas that records all information of elements of its octave. Atoms can be considered merely as various states of motion of one cosmic substance, and are locked into their energetically permitted positions on their octave waves.

TABLE 1

Elemental Compositions of the Zero-Time Neutralized NaOH, the White Precipitate and the Reactor Glass

Neutralized NaOH				White precipitate				Reactor glass material			
	ppm		ppm		ppm		ppm		ppm		ppm
								C	4,200		
Al	0.63	Mo	0.005	Al	20,000	Mo	0.12	Al	14,200	Mo	6.7
Sb	ND	Nd	ND	Sb	0.49	Nd	0.43	Sb	0.44	Nd	0.52
As	ND	Ni	0.1	As	ND	Ni	250	As	0.43	Ni	1.4
Ba	0.18	Nb	ND	Ba	3.8	Nb	ND	Ba	7.9	Nb	0.29
Be	ND	Os	ND	Be	0.15	Os	ND	Be	0.13	Os	ND
Bi	ND	Pd	ND	Bi	ND	Pd	0.15	Bi	ND	Pd	0.22
B	1.3	P	ND	B	590	P	10	B	24,600	P	12
Br	ND	Pt	ND	Br	ND	Pt	ND	Br	ND	Pt	ND
Cd	ND	K	11	Cd	0.08	K	480	Cd	ND	K	1810
Ca	0.49	Pr	ND	Ca	2,100	Pr	0.11	Ca	265	Pr	0.14
Ce	ND	Re	ND	Ce	74	Re	ND	Ce	1.8	Re	ND
Cs	0.007	Rh	ND	Cs	0.27	Rh	ND	Cs	1.12	Rh	ND
Cr	0.031	Rb	0.005	Cr	7.3	Rb	0.82	Cr	7.7	Rb	1.09
Co	ND	Ru	ND	Co	6.4	Ru	0.1	Co	1.29	Ru	ND
Cu	0.006	Sm	ND	Cu	12	Sm	0.08	Cu	0.89	Sm	0.09
Dy	ND	Se	ND	Dy	0.1	Se	ND	Dy	0.13	Se	ND
Er	ND	Si	1.5	Er	0.09	Si	400,000	Er	0.11	Si	338,700
Eu	ND	Ag	ND	Eu	ND	Ag	2.7	Eu	ND	Ag	ND
Gd	ND	Na	66,000	Gd	0.2	Na	43,400	Gd	0.13	Na	29,000
Ga	ND	Sr	0.053	Ga	2	Sr	14	Ga	1.26	Sr	2.77
Ge	ND	Ta	ND	Ge	0.1	Ta	ND	Ge	1.13	Ta	0.07
Au	ND	Te	ND	Au	ND	Te	ND	Au	ND	Te	ND
Hf	ND	Tl	ND	Hf	7.6	Tl	ND	Hf	8.69	Tl	ND
Ho	ND	Th	ND	Ho	ND	Th	0.37	Ho	ND	Th	0.19
I	ND	Tm	ND	I	ND	Tm	ND	I	ND	Tm	ND
Ir	ND	Sn	ND	Ir	ND	Sn	1.1	Ir	ND	Sn	ND
Fe	0.27	Ti	ND	Fe	450	Ti	84	Fe	233	Ti	31
La	0.019	W	ND	La	0.92	W	ND	La	0.9	W	1.49
Pb	ND	U	0.004	Pb	18	U	0.47	Pb	1.39	U	0.22
Li	0.018	V	ND	Li	0.28	V	0.09	Li	9.23	V	0.42
Lu	ND	Yb	ND	Lu	ND	Yb	0.16	Lu	ND	Yb	0.16
Mg	0.038	Y	ND	Mg	880	Y	0.64	Mg	33	Y	0.81
Mn	0.019	Zn	0.035	Mn	17	Zn	32	Mn	5.89	Zn	ND
Hg	ND	Zr	ND	Hg	ND	Zr	510	Hg	ND	Zr	459

ND not detectable

[0048] In the reflux reaction, high purity NaOH is used which contains sodium, the element consumed during reflux. Sodium is positioned as the first element of the fifth octave of the spiral periodic table of elements (6, 7). Silicon is at wave amplitude of the fifth octave, i.e., it is the element of highest orbital velocity, the highest melting point, the most compact crystallization, and the hardest one among the elements of the fifth octave.

[0049] As objects of matter can be considered to be accumulations of electric energy (5, 6), elements may be converted into each other by the proper injection of electric energy, which can switch an element's gyroscopic plane of motion to the next locked position on its octave wave, or up to octave wave amplitude or even further up into higher octaves.

[0050] In our atomic transformation reaction, we have relied on the high ionic/electric activity of extreme pH to inject the electric pressure necessary to cause a switch of the gyroscopic sodium atom into other locked positions on its octave wave, and thus transform it into Mg, Al and Si at increasing concentrations in the very same order. Heating is necessary because heating destabilizes the normally locked gyroscopic oscillatory motion of elements, and facilitates transition into other locked positions that correspond to other elements.

[0051] We have tested whether the white precipitate had an autocatalytic effect on itself and could give rise to previously absent elements. We heated 0.2 g of white precipitate in a platinum crucible at 1000° C. for 1 hr in air atmosphere. On SEM-EDS analysis, the heated sample showed significant composition changes compared to the starting sample (FIGS. **3** & **4**). Numerous bright, highly electron-dense crystals appeared, highly variable in appearance and elemental composition (FIGS. **4**-**6** and **7**-**9**). These were previously undetectable.

[0052] The elemental composition of the silicate matrix in FIG. **4** also differs from that of the starting white precipitate (FIG. **2**). The concentration of Na increased, with Mg and Ca appearing as prominent new elements (FIG. **8**). Some loss of Si was also evident. We have performed the analysis of a bright, electron dense cluster located in the center of FIG. **4**. Analyses show high Fe concentration, accompanied by Cr, Ni, Mn and Cu (FIGS. **10**A & **10**B). Subsequently, we selected stand-alone crystals for analysis. Crystal **1** contains high concentrations of Al and Zr (FIGS. **5** & **9**). Crystal **2** (FIG. **6**) is mainly composed of Au and Pd (FIG. **11**), while crystal **3** (FIG. **7**) is composed of almost pure W (FIG. **12**). Au and W were both undetectable in the white precipitate.

[0053] These observations indicate an innate catalytic ability, and raise the possibility of the de novo synthesis of a wide range of metals of industrial significance. Possibly, the white precipitate is an "electrically activated" substance, a property common to catalysts, capable of stimulating atomic transformations of its own. Although the overall yield of elements of higher atomic numbers is low, this will be possible to improve with further research.

[0054] The results confirm our hypothesis that atomic transformation requires electric pressure along with heating, which may be Nature's method of synthesizing matter. We have also confirmed fundamental observations of the spiral periodic table of elements (6, 7). In agreement with Russell's theory, we have redefined atomic transformation as atomic rather than "nuclear" (5) and now propose that the nuclear atom hypothesis is inconsistent with Nature's processes. If atomic bodies are generated by external electromagnetic pressure waves (4-7), the atom cannot have an energy of its own capable of attracting from the inside, e.g., from a solid nucleus. Instead, the atom should be viewed as a wound-up spring that seeks equilibrium with its low-pressure environment, and will do so unless maintained by a continuous input of energy. The physical nature of such an energy source remains to be determined.

[0055] We have proven that atomic transformations are feasible under conditions typical of chemical catalysis, and so it is plausible that the ancient art of alchemy could have had substance. Acidic (vinegar) and basic (lye) chemicals have been known since ancient times. Silicate compounds are widely distributed in Earth's crust. High temperatures and alkaline as well as acidic conditions are also present there. Therefore, the geochemical conditions are given for the ongoing de novo synthesis of elements in Earth's crust, and it is likely that some marine chemicals may actually help build continents.

[0056] Kervran described that egg-laying hens when fed with calcium-deficient but potassium and silicon-containing diet still laid hard-shell eggs (8). In our experiment, calcium formation was also observed in the white precipitate, as well as during its subsequent heating. We have demonstrated the formation of elements of higher atomic numbers during heating of the white precipitate. Living organisms have the ability to catalyze reactions that would require temperatures of 1000° C. by nonbiologic methods of chemistry. It is possible that an electrically activated silicon compound, when ingested, could be transformed into elements of higher atomic numbers inside living cells and thus provide a novel avenue of mineral supplementation.

[0057] This study opens the possibility of low energy controlled synthesis of elements, and demonstrates the need for a revision of our theoretical framework of atomic processes. Further studies in this field could help resolve a number of environmental problems including the accumulation of radioactive waste, as well as pollution caused by mining operations. It appears that new theoretical considerations of the atom may well propel physical and material sciences into a new era of inconceivable possibilities.

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ADVANTAGES OF THE INVENTION

[0066] This study opens the possibility of low energy controlled synthesis of elements. Electric pressure is generated by the combination of the high ionic/electric activity of extreme pH that is operational at both ends of the pH spectrum; i.e., both basic and acidic catalysis can be used to different ends. In addition, heating is required. The solid phase catalyst may react with other elements of the periodic table and induce atomic transformation reactions. Among these elements, both stable and radioactive elements may be used. Further studies could help resolve a number of serious environmental problems, including the accumulation of radioactive waste. Also, polluting and dangerous mining operations and foundries could be replaced by a new synthetic metals industry.

[0067] With respect to ranges of values, the invention encompasses each intervening value between the upper and lower limits of the range to at least a tenth of the lower limit's unit, unless the context clearly indicates otherwise. Moreover, the invention encompasses any other stated intervening values and ranges including either or both of the upper and lower limits of the range, unless specifically excluded from the stated range.

[0068] Unless defined otherwise, the meanings of all technical and scientific terms used herein are those commonly understood by one of ordinary skill in the art to which this invention belongs. One of ordinary skill in the art will also appreciate that methods and materials similar or equivalent to those described herein can also be used to practice or test this invention.

[0069] The publications and patents discussed herein are provided solely for their disclosure prior to the filing date of the present application. Nothing herein is to be construed as an admission that the present invention is not entitled to antedate such publication by virtue of prior invention. Further, the dates of publication provided may be different from the actual publication dates that may need to be independently confirmed.

[0070] All publications cited are incorporated herein by reference in their entireties, including all published patents, patent applications, literature references, as well as those publications that have been incorporated in those published documents. However, to the extent that any publication incorporated herein by reference refers to information to be published, applicants do not admit that any such information published after the filing date of this application to be prior art.

[0071] As used in this specification and the appended claims, the singular forms include the plural forms. For example the terms "a," "an," and "the" include plural references unless the content clearly dictates otherwise. Additionally, the term "at least" preceding a series of elements is to be understood as referring to every element in the series. The inventions illustratively described herein can suitably be practiced in the absence of any element or elements, limitation or limitations, not specifically disclosed herein. Thus, for example, the terms "comprising," "including," "containing," etc. shall be read expansively and without limitation. Additionally, the terms and expressions employed herein have been used as terms of description and not of limitation, and there is no intention in the use of such terms and expressions of excluding any equivalents of the future shown and described or any portion thereof, and it is recognized that various modifications are possible within the scope of the invention claimed. Thus, it should be understood that although the present invention has been specifically disclosed by preferred embodiments and optional features, modification and variation of the inventions herein disclosed can be resorted by those skilled in the art, and that such modifications and variations are considered to be within the scope of the inventions disclosed herein. The inventions have been described broadly and generically herein. Each of the narrower species and subgeneric groupings falling within the scope of the generic disclosure also form part of these inventions. This includes the generic description of each invention with a proviso or negative limitation removing any subject matter from the genus, regardless of whether or not the excised materials specifically resided therein. In addition, where features or aspects of an invention are described in terms of the Markush group, those schooled in the art will recognize that the invention is also thereby described in terms of any individual member or subgroup of members of the Markush group. It is also to be understood that the above description is intended to be illustrative and not restrictive. Many embodiments will be apparent to those of in the art upon reviewing the above description. The scope of the invention should therefore, be determined not with reference to the above description, but should instead be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled. Those skilled in the art will recognize, or will be able to ascertain using no more than routine experimentation, many equivalents to the specific embodiments of the invention described. Such equivalents are intended to be encompassed by the following claims.

1. A method of atomic transformation comprising:
(a) providing a liquid phase catalyst utilizing high ionic/electric energy;
(b) heating the liquid phase catalyst;
(c) neutralizing the liquid phase catalyst to prepare a solid phase catalyst;
(d) performing solid phase catalysis by heating the solid phase catalyst at high temperature; and
(e) heating the solid phase catalyst with an element or its compound to achieve atomic transformation.

2. The method of claim **1** wherein electric pressure is generated in order to facilitate elemental transformation.

3. The method of claim **1** wherein heating and electric pressure are used in combination.

4. The method of claim **1** wherein the liquid phase catalyst is a base.

5. The method of claim **1** wherein the liquid phase catalyst is an acid.

6. The method of claim **1** wherein the reaction temperature of the liquid phase catalytic step is between about 80° C. and about 250° C.

7. The method of claim **1** wherein the reaction time for the liquid phase catalytic step is from about 5 hours to about 24 hours.

8. The method of claim **1** wherein the heating temperature of the liquid phase catalyst is between about 100° C. and about 120° C.

9. The method of claim **1** wherein the neutralization step yields a solid phase catalyst in the form of a white precipitate.

10. The method of claim **9** wherein the white precipitate contains sodium, aluminum, silicon, and oxygen as main constituents.

11. The method of claim **1** wherein the white precipitate catalyst is heated at a temperature range of from about 800° C. to about 1700° C.

12. The method of claim **1** wherein the white precipitate catalyst is heated at a temperature range of from about 800° C. to about 1700° C. with an element.

13. The method of claim **1** wherein new elements are generated in the method.

14. The method of claim **13** wherein the new elements include at least one element selected from the group consisting of magnesium, aluminum, calcium, palladium, copper, gold, silver, zinc, tungsten, iron, manganese, nickel, zirconium and chromium.

15. The method of claim **1** wherein each of the synthesized elements produced by the method has an atomic mass higher than sodium.

16. A method of use of a product produced by the method of claim **1** in a biological system comprising the step of administering the product to the biological system.

17. The method of use of claim **16** wherein the biological system is a microorganism.

18. The method of use of claim **16** wherein the biological system is a eukaryote.

19. The method of use of claim **18** wherein the eukaryote is a higher plant.

20. The method of use of claim **18** wherein the eukaryote is a human.

21. The method of claim **1** wherein at least one element is produced selected from the group consisting of magnesium, lithium, aluminum, beryllium, calcium, potassium, rubidium, phosphorus, strontium, cesium, silicon, iron, nickel, chromium, manganese, cobalt, copper, zinc, molybdenum, titanium, antimony, silver, gold, palladium, vanadium, zirconium, tin, neodymium, cerium, hafnium, lanthanum, ytterbium, yttrium, lead, uranium, and tungsten.

23. A method of atomic transformation comprising the step of applying sufficient electric pressure along with sufficient heating resulting in de novo synthesis of at least one element selected from the group consisting of magnesium, lithium, aluminum, beryllium, calcium, potassium, rubidium, phosphorus, strontium, cesium, silicon, iron, nickel, chromium, manganese, cobalt, copper, zinc, molybdenum, titanium, antimony, silver, gold, palladium, vanadium, zirconium, tin, neodymium, cerium, hafnium, lanthanum, ytterbium, yttrium, lead, uranium, and tungsten.

24. The method of claim **23** where each of the synthesized elements has a atomic mass greater than that of sodium.

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