METALS - GENERAL

1. Fill the table with formula of the compounds formed by ions with some metals.

	Sulfate	Hydroxide	Oxide
Potassium			
Calcium			
Aluminum			
Iron (III)			

2. Match the metals with properties given below.

Metals	Properties
Lithium	has magnetic property
Barium	most abundant metal
Aluminum	the softest alkaline earth metal
Iron	has +1 oxidation state

3. Fill the table with the metals given below;

$_{19}K$, $_{13}Al$, $_{12}Mg$, $_{3}Li$, $_{26}Fe$, $_{20}Ca$

Metals	Oxidation State	"spdf" for last shell	Group in PT	Period in PT

4. Match the formula of substances with their common names

Formula	Common Names
NaCl	Pyrite
Na_2CO_3	Lime water
$NaHCO_3$	Quick lime
$Al_2O_3.2H_2O$	Gypsum
FeS_2	Table salt
Fe_3O_4	Alum
$CaCO_3$	Carbide
CaO	Antacid
$Ca(OH)_2$	Washing soda
$CaSO_4.2H_2O$	Bauxite
$Mg(OH)_2$	Baking powder
Al_2O_3	Magnetite
CaC_2	Limestone

5. Fill the table with metals and their uses below;
Ca, Fe, Mg, Al, Na, Ba, Li,

	In nuclear reactors to transfer heat
	In batteries
	In high voltage electrical lines
	In the production of steel as raw material

6. Explain the following phenomena with their reactions;
A. Gun powder
B. Thermite reaction
C. Air bag

7. Find the oxidation states of;
A. Carbon in CaC_2
B. Potassium in K_3PO_4
C. Silicon in $Al_2S_2O_7$
D. Iron in Fe_3O_4

8. Fill the table with metals and their preparation methods;

Metals	Preparation methods
Fe	
	Down method
Al	

9. Determine the following statements true or false.
A. Naturally magnetic elements are Fe, Ni, Cu.
B. Iron prepared in blast furnace.
C. Iron is the basic component of hemoglobin in blood
D. Sodium is a soft metal.
E. Oxides of alkali metals have acidic character.
F. Alkali metals are less dense than water.
G. Rubidium is radioactive element.
H. Alkali metals can be determined by their color.
I. Aluminum is precious metal used in jewelry.
J. Transition metals mainly have more than one oxidation states.

10. Find the mass percentages of metals in their compounds given below.
A. K in KNO_3
B. Ca in $CaSO_4.2H_2O$
C. Al in $K_2Al_2Si_6O_{16}$
D. Fe in Fe_3O_4

11. Complete the following reactions below,
A. $Na + O_2 \rightarrow$
B. $NaCl$ + Electricity $\rightarrow$
C. $K_2O + H_2O \rightarrow$
D. $NaOH + H_2S \rightarrow$
E. $Li_2O + SO_3 \rightarrow$
F. Na_2CO_3 + heat $\rightarrow$
G. $Ba + H_2O \rightarrow$
H. $Mg + HCl \rightarrow$
I. $CaO + H_2O \rightarrow$
J. $CaCO_3$ + heat $\rightarrow$
K. $Ca(OH)_2 + CO_2 \rightarrow$
L. $CaC_2 + H_2O \rightarrow$
M. $Al + HCl \rightarrow$
N. $Al + NaOH \rightarrow$
O. $Al_2O_3 + HNO_3 \rightarrow$
P. $Al_2O_3 + KOH \rightarrow$
R. $Al + Fe_2O_3 \rightarrow$
S. $Al + Zn(NO_3)_2 \rightarrow$
T. $FeO + Al \rightarrow$
U. $FeCl_2$ + electricity $\rightarrow$
V. $Fe + H_2SO_4 \rightarrow$
Y. $Fe + NaOH \rightarrow$
Z. $Fe + H_2O \rightarrow$

12. Complete the following transformations below.

A. $Na \rightarrow NaOH \rightarrow Na_2O \rightarrow NaCl \rightarrow Na$

B. $K \rightarrow K_2CO_3 \rightarrow K_2O \rightarrow KOH \rightarrow K_2SO_4$

C. $C \rightarrow CO \rightarrow CO_2 \rightarrow CaCO_3 \rightarrow CaO \rightarrow CaSO_4$

D. $Al \rightarrow Al_2(SO_4)_3 \rightarrow Al(OH)_3 \rightarrow Al_2O_3 \rightarrow KAlO_2$

E. $Fe(OH)_3 \rightarrow Fe_2O_3 \rightarrow Fe \rightarrow FeCl_2 \rightarrow FeSO_4$

13. Calculate the mass of sodium metal and water that is necessary to produce 168 L of hydrogen gas at STP by the reaction of sodium with enough water.

14. A 200 g sample of Li-K alloy, 40% by mass is K, reacted with oxygen gas. Calculate the volume of oxygen gas at STP necessary for the reaction.

15. A 250 g sample of limestone that is 25% impure, decomposed by heat. Calculate the mass of CO_2 produced from the reaction.

16. Calculate the mass of water must be used to prepare 51.6 grams of gypsum from calcium sulfate.

17. Following reaction of an alkaline earth metal with sulfuric acid is given;

$$M + H_2SO_4 \rightarrow MSO_4 + H_2$$

When 1.2 g of the metal is reacted with enough sulfuric acid 1.12 L of hydrogen gas at STP is obtained. Fin the metal.

18. In a thermite reaction 600 g of aluminum powder was used and 1120 g of iron was obtained. Calculate the percentage purity of aluminum powder.

19. Calculate the percent of copper in an 87.5 g Mg-Cu alloy, when it reacted with enough hydrochloric acid, produces 22.4 L hydrogen gas at STP.

20. Calculate the yield (efficiency) of the reaction between 60 g of iron (III) oxide and excess hydrogen gas to produce 33.6 g of iron according to the reaction below;

$$Fe_2O_3 + H_2 + \text{heat} \rightarrow Fe + H_2O$$

21. Calculate the total volume of gases at STP produced in an explosion of gun powder composed of 40 g of potassium nitrate and 32 g of sulfur according to the reaction below;

$$2KNO_3 + S + C \rightarrow K_2S + N_2 + 3CO_2$$

22. An iron sample reacted with 200 ml sulfuric acid solution with 40% by mass and 1.2 g/mL density. Calculate the mass of iron (II) sulfate produced.