Unit Test: Chemistry (50 marks)

Name: _____

1. Which of the following comparisons describes a proton?

	Charge	Location
A	none	in the nucleus
B	positive	in the nucleus
C	positive	outside the nucleus
D	negative	outside the nucleus

2. Which of the following groups of elements contains metals and non-metals?
   - A Group 14
   - B Group 18
   - C Group 2
   - D Group 3

3. Which of the following correctly describes the electron arrangement in Magnesium?
   - A 3, 8, 1
   - B 2, 8, 2
   - C 1, 8, 3
   - D 8, 2, 2

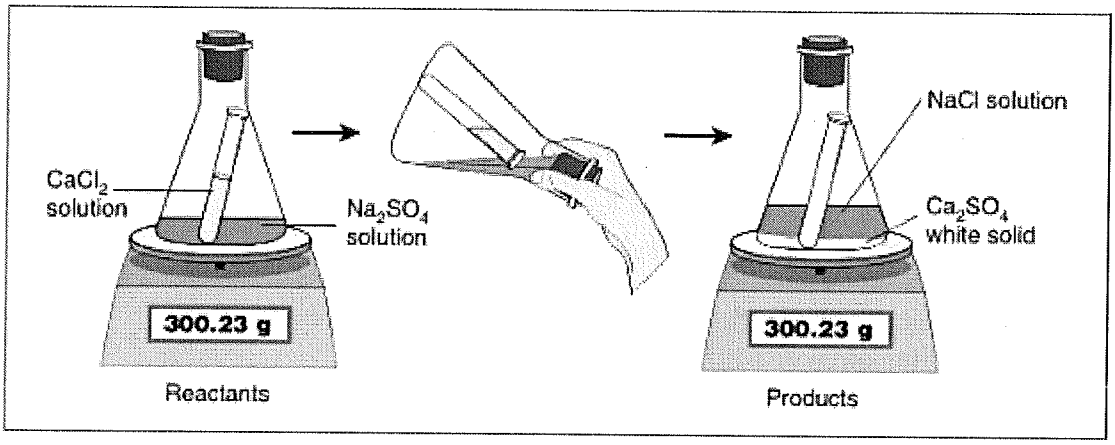
4. The Lewis diagram to the right has enough electrons to represent either
   - A a helium atom or a lithium atom
   - B a neon atom or a fluorine atom
   - C an argon atom or a sulphide ion
   - D a potassium atom or a calcium atom

5. The atoms of which isotope are correctly described in the chart below?

	Isotope	Number of Protons	Number of Neutrons
A.	Bromine-81	81	0
B.	Copper-65	20	45
C.	Nitrogen-16	7	9
D.	Thorium-235	90	235

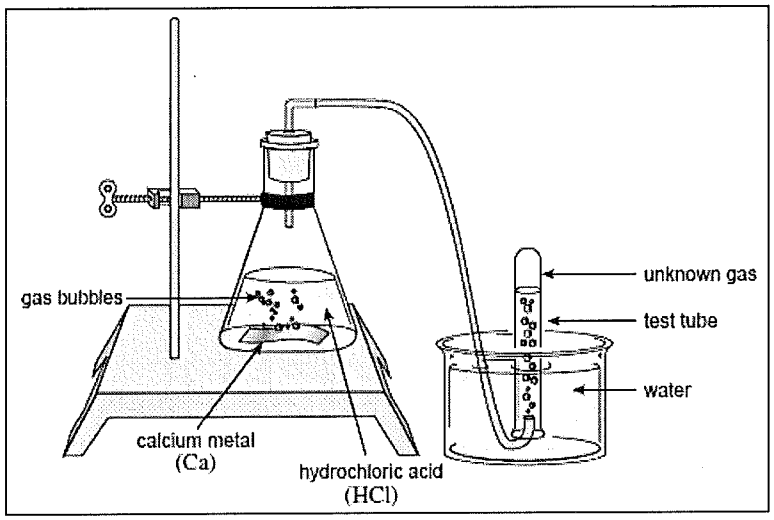
A Iodine-131
B Copper-65
C Nitrogen-16
D Thorium-235

Use the following diagram of an experiment to help you answer question 6:



6. What is demonstrated by the procedure shown in the illustration?
   A The neutralization of an acid with a base
   B The conservation of mass during a chemical change
   C The effect of a catalyst on the rate of a chemical reaction
   D The effect of surface area in a double replacement reaction

Use the following information to answer question 7



7. What is the balanced equation for the reaction in the experiment above?

   A $Ca + Cl_2 \rightarrow CaCl_2$

   B $Ca + 2\ HCl \rightarrow CaCl_2 + H_2$

   C $Ca + 2\ HCl \rightarrow CaH_2 + Cl_2$

   D $2\ Ca + 2\ H_2O \rightarrow 2\ CaH_2 + O_2$

8. When the following equation is balanced, the coefficient of H_2S is _____.

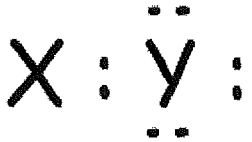
$$\_\ FeCl_{3(aq)} + \_\ H_2S_{(g)} \rightarrow \_\ Fe_2S_{3(s)} + \_\ HCl_{(aq)}$$

   A 1
   B 2
   C 3
   D 5

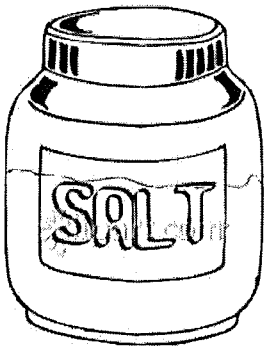
9. A new element is discovered that is highly reactive and is missing only one electron in its valence shell. Which family is this element most likely to belong?
   A Alkali metal
   B Alkaline earth metal
   C Halogen
   D Noble gas

10. Which of the following pair of elements could be represented by X and Y given below?

	X	Y
A	aluminum	chlorine
B	chlorine	hydrogen
C	hydrogen	carbon
D	hydrogen	chlorine



11. How many oxygen atoms are contained within the **reactants** of this balanced equation?



$$\mathbf{2\ C_{12}H_{22}O_{11} + 2\ H_2SO_4 \rightarrow 13C + 24H_2O + 2\ SO_2 + 1\ CO_2}$$

A 15
B 22
C 24
D 30

12. If phenolphthalein indicator is pink and indigo carmine indicator is yellow, what is the most likely pH of the substance?

A 2
B 7
C 9
D 14

13. Which of the following is a **salt?**

A $Al_2(SO_4)_3$
B HCN
C $Sr(OH)_2$
D H_3PO_4

14. Pickles will cause methyl orange to turn yellow but methyl red to turn red. Which combination below best describes the chemical nature of a pickle?

	pH	Chemical Type
A	Less than 4	Acidic
B	Greater than 5	Neutral
C	Between 4 and 5	Acidic
D	Greater than 6	Neutral

15. What type of reaction would be expected when sodium phosphate reacts with calcium chloride?
    A Synthesis
    B Combustion
    C Decomposition
    D Double replacement

16. If a solution is basic, it can be neutralized by adding
    A An acid
    B A base
    C Water
    D A salt

17. Shaniqua is given four test tubes. She is asked to determine whether the substance in each test tube is acidic, basic or neutral. She makes the following observations:

Indicator	Test Tube 1	Test Tube 2	Test Tube 3	Test Tube 4
Red litmus	No colour change	Turns blue	No colour change	No colour change
Bromothymol Blue	Turns yellow	Turns Blue	Green	Turns Yellow
Phenolphthalein	No colour change	Turns pink	No colour change	No colour change

Which of the following conclusions is supported by the observations?

    A Test tube 1 is basic
    B Test tube 2 is acidic
    C Test tube 3 is neutral
    D Test tube 4 is basic

18. What are the products of an acid-base neutralization reaction?
    A A salt and water
    B A salt and hydrogen
    C Hydrogen and water
    D Water and hydroxide

19. What reactants form the salt $FePO_4$ in a neutralization reaction?
    A PO_4 and Fe_2O_3
    B H_3P and $Fe(OH)_3$
    C H_2O and $Fe(OH)_2$
    D H_3PO_4 and $Fe(OH)_3$

20. What type of chemical reaction would take place if ammonium chloride were to react with liquid bromine?

A Synthesis
B Neutralization
C Single Replacement
D Double Replacement

21. Which of the following will **not** increase a chemical reaction's rate?

A Increasing surface area
B Adding a catalyst
C Decreasing concentration
D Increasing temperature

22. If two substances react and the temperature of the mixture decreases, the reaction is

A Endothermic
B Exothermic
C Never going to happen unless it is heated
D One that causes atoms to be destroyed

23. Which of the following equations is correctly balanced and represents an an exothermic reaction?

A $C_6H_{12}O_{6\,(g)} + O_{2(g)} + \text{heat} \rightarrow 6\ CO_{2(g)} + 6\ H_2O_{(g)}$

B $C_6H_{12}O_{6\,(g)} + O_{2(g)} \rightarrow 6\ CO_{2(g)} + 6\ H_2O_{(g)} + \text{heat}$

C $C_6H_{12}O_{6\,(g)} + 6\ O_{2(g)} + \text{heat} \longrightarrow 6\ CO_{2(g)} + 6\ H_2O_{(g)}$

D $C_6H_{12}O_{6\,(g)} + 6\ O_{2(g)} \rightarrow 6\ CO_{2(g)} + 6\ H_2O_{(g)} + \text{heat}$

24. This WHMIS symbol is used to label a material that is _____.

A Flammable
B Corrosive
C Biohazardous
D Carcinogenic

Written Response (26 marks)

1. Draw the lewis diagram for the covalent compound C_2H_6 (2 marks)

2. Identify each of the compounds as either **ionic (I)** or **covalent (C)**, then name the compound or give the chemical formula (1 mark each)

   a. Al_2S_3 _____ _____

   b. N_2O_4 _____ _____

   c. $Pb_3(PO_4)_2$ _____ _____

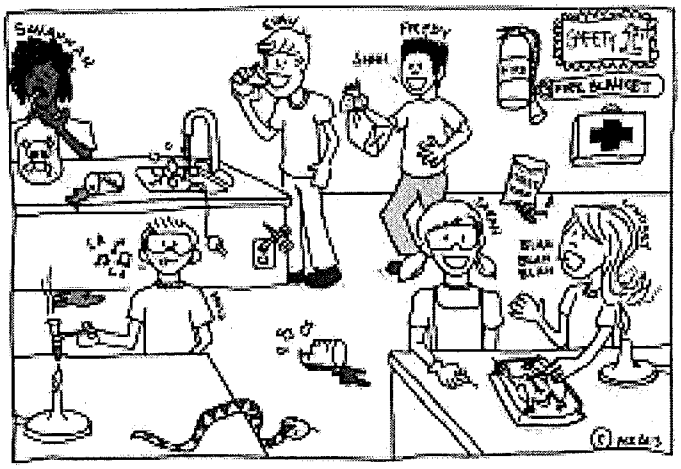
   d. Lithium oxide _____ _____

   e. Hydrogen _____ _____

   f. Tin(iv) fluoride _____ _____

   g. Sulfur dioxide _____ _____

3. Identify three things that are wrong with this out-of-control science lab, then write how you would make it a safer place to work in. (3 marks)



i)

ii)

iii)

4. Balance the following chemical reactions (1 mark each)

a. The combustion of ethene:

$$\_\_\_\_ C_2H_4 + \_\_\_\_ O_2 \rightarrow \_\_\_\_ CO_2 + \_\_\_\_ H_2O$$

b. The synthesis of phosphorus trifluoride:

$$\_\_P_4 + \_\_F_2 \rightarrow \_\_PF_3$$

4. Rewrite the **word** equation to make a **balanced** chemical equation (2 marks each)

a. Calcium sulfate and aluminum bromide **react** to make calcium bromide and aluminum sulfate.

b. Sodium + calcium fluoride **react** to make sodium fluoride and calcium.

c. Lithium and oxygen **react** to make lithium oxide

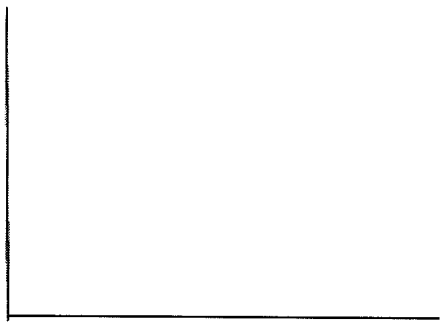
5. Classify the reaction, predict the products and balance. (1.5 marks each)

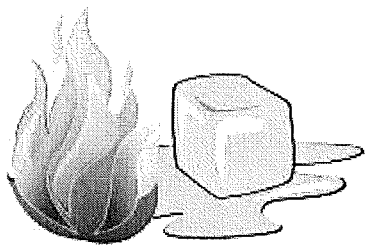
a. $\_\_F_2 + \_\_Ba \rightarrow$ _____

b. $\_\_FeCl_3 + \_\_O_2 \rightarrow$ _____

6. You have just added two unknown chemicals together and have noticed that the surroundings feel warmer.

   Sketch a potential energy diagram labeling the **axes**, and on the graph, the **reactants and products.** Indicate if it is **endothermic** or **exothermic**. (3 marks)





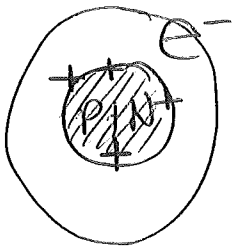
The End

Unit Test: Chemistry (50 marks) **Name:** KEY

1. Which of the following comparisons describes a proton?

B

	Charge	Location
A	none ✗	in the nucleus ✓
(B)	positive ✓	in the nucleus ✓
C	positive ✓	outside the nucleus ✗
D	negative ✗	outside the nucleus ✗



2. Which of the following groups of elements contains metals and non-metals?

A

(A) Group 14
~~B Group 18~~ nonmetals
C Group 2 metals
D Group 3 metals

3. Which of the following correctly describes the electron arrangement in Magnesium?

B

A 3, 8, 1
(B) 2, 8, 2
C 1, 8, 3
D 8, 2, 2

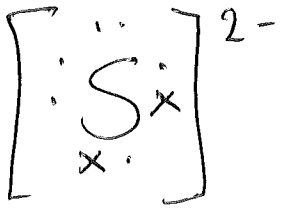
Mg has 12 e⁻

Mg 2, 8, 2

4. The Lewis diagram to the right has enough electrons to represent either

C

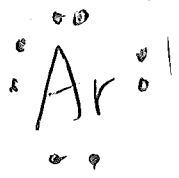
A a helium atom or a lithium atom
B a neon atom or a fluorine atom
(C) an argon atom or a sulphide ion
D a potassium atom or a calcium atom



8e⁻

2 gained from charge

6 valence



8e⁻

all valence

5. The atoms of which isotope are correctly described in the chart below?

	Isotope	Number of Protons	Number of Neutrons
A.	Bromine-81	~~81~~	0
B.	Copper-65	~~20~~	45
C.	Nitrogen-16	7	9
D.	Thorium-235	✓90	~~235~~

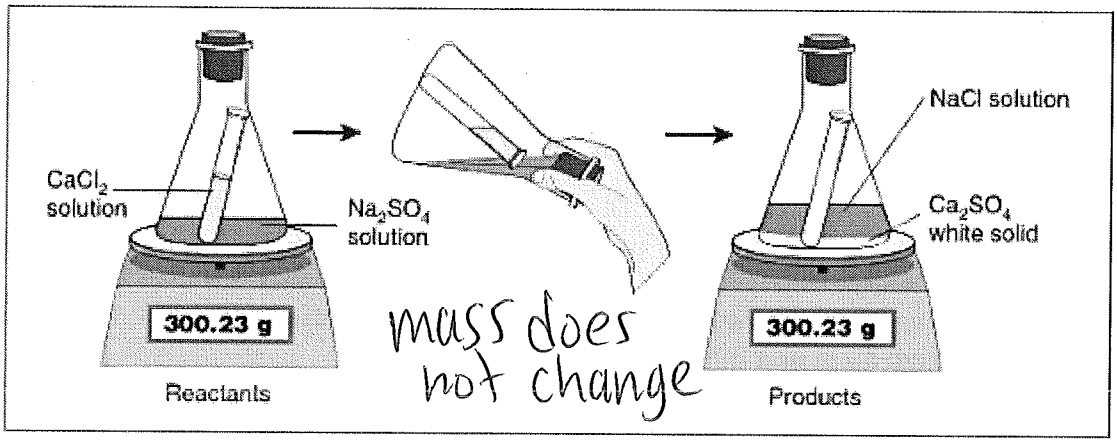
look at mass number

C

A Iodine-131
B Copper-65
C Nitrogen-16
D Thorium-235

↑ look at atomic number

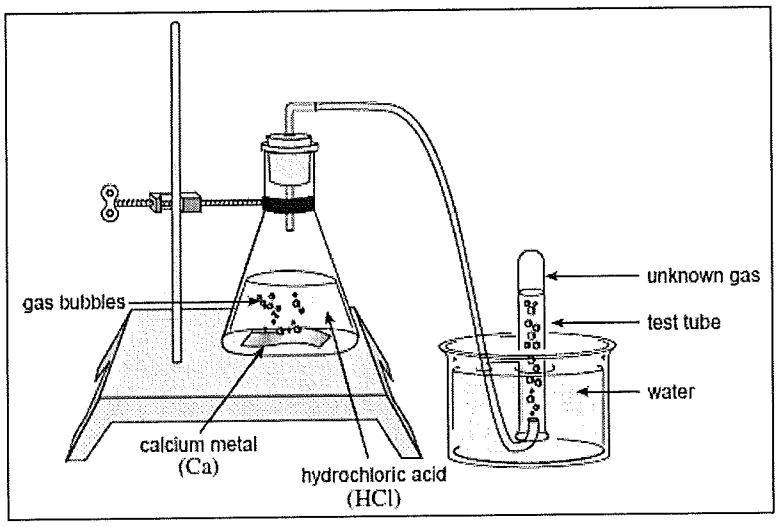
Use the following diagram of an experiment to help you answer question 6:



6. What is demonstrated by the procedure shown in the illustration?
   A The neutralization of an acid with a base
   B The conservation of mass during a chemical change
   C The effect of a catalyst on the rate of a chemical reaction
   D The effect of surface area in a double replacement reaction

B

Use the following information to answer question 7



7. What is the balanced equation for the reaction in the experiment above?

B

~~A $Ca + Cl_2 \rightarrow CaCl_2$~~

B $Ca + 2\ HCl \rightarrow CaCl_2 + H_2$

C $Ca + 2\ HCl \rightarrow CaH_2 + Cl_2$

~~D $2\ Ca + 2\ H_2O \rightarrow 2\ CaH_2 + O_2$~~

HCl
H^+ Cl^-
SR
$CaCl_2$

8. When the following equation is balanced, the coefficient of H_2S is _____.

$$\underline{2}\ FeCl_{3(aq)} + \underline{3}\ H_2S_{(g)} \rightarrow \underline{1}\ Fe_2S_{3(s)} + \underline{6}\ HCl_{(aq)}$$

C

A 1
B 2
C 3
D 5

9. A new element is discovered that is highly reactive and is missing only one electron in its valence shell. Which family is this element most likely to belong?

C

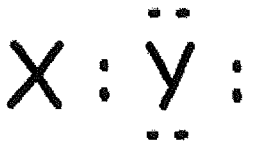
A Alkali metal
B Alkaline earth metal
C Halogen
D Noble gas

7 valence electrons
must be halogen

10. Which of the following pair of elements could be represented by X and Y given below?

D

	X	Y
A	aluminum	chlorine
B	chlorine	hydrogen
C	hydrogen	carbon
(D)	hydrogen	chlorine



H : Cl :

only atom that is stable w/ 2 ve.

11. How many oxygen atoms are contained within the **reactants** of this balanced equation?

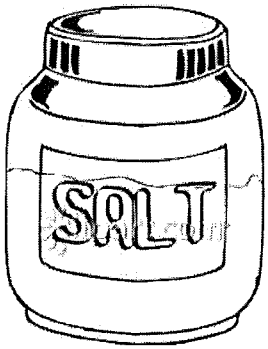
$$2\ C_{12}H_{22}O_{11} + 2\ H_2SO_4 \rightarrow 13C + 24H_2O + 2\ SO_2 + 1\ CO_2$$

D

A 15
B 22
C 24
(D) 30

2×4 + 2×11

8 + 22



12. If phenolphthalein indicator is pink and indigo carmine indicator is yellow, what is the most likely pH of the substance? > 13 -> 9

D

A 2
B 7
C 9
(D) 14

13. Which of the following is a **salt?**

A

(A) $Al_2(SO_4)_3$ salt
B HCN acid
C $Sr(OH)_2$ base
D H_3PO_4 acid

greater than 4 less than 5

14. Pickles will cause methyl orange to turn yellow but methyl red to turn red. Which combination below best describes the chemical nature of a pickle?

C

	pH	Chemical Type
A	Less than 4	Acidic
B	Greater than 5	Neutral
(C)	Between 4 and 5	Acidic
D	Greater than 6	Neutral

< 7, must be acidic

15. What type of reaction would be expected when sodium phosphate reacts with calcium chloride?

Na_3PO_4 + $CaCl_2$
compound compound

D

A Synthesis
B Combustion
C Decomposition
(D) Double replacement

16. If a solution is basic, it can be neutralized by adding

acid + base → salt + water (neutral)

A

(A) An acid
B A base
C Water
D A salt

17. Shaniqua is given four test tubes. She is asked to determine whether the substance in each test tube is acidic, basic or neutral. She makes the following observations:

Indicator	Test Tube 1	Test Tube 2	Test Tube 3	Test Tube 4
Red litmus	No colour change	Turns blue	No colour change	No colour change
Bromothymol Blue	Turns yellow	Turns Blue	Green	Turns Yellow
Phenolphthalein	No colour change	Turns pink	No colour change	No colour change
	ACID	BASE	NEUTRAL	ACID

Which of the following conclusions is supported by the observations?

C

A ~~Test tube 1 is basic~~
B ~~Test tube 2 is acidic~~
(C) Test tube 3 is neutral
D Test tube 4 is basic

18. What are the products of an acid-base neutralization reaction?

ACID + BASE → SALT + WATER

A

(A) A salt and water
B A salt and hydrogen
C Hydrogen and water
D Water and hydroxide

19. What reactants form the salt $FePO_4$ in a neutralization reaction?

$H_3PO_4 + Fe(OH)_3 \longrightarrow FePO_4 + 3H_2O$

D

A PO_4 and Fe_2O_3
B H_3P and $Fe(OH)_3$
C H_2O and $Fe(OH)_2$
(D) H_3PO_4 and $Fe(OH)_3$

20. What type of chemical reaction would take place if ammonium chloride were to react with liquid bromine?

C

A Synthesis
B Neutralization
C Single Replacement
D Double Replacement

$NH_4Cl + Br_2$
compound element

21. Which of the following will **not** increase a chemical reaction's rate?

C

A Increasing surface area ✓
B Adding a catalyst ✓
C Decreasing concentration ✗
D Increasing temperature ✓

22. If two substances react and the temperature of the mixture decreases, the reaction is

A

A Endothermic
B Exothermic
C Never going to happen unless it is heated
D One that causes atoms to be destroyed

surroundings colder. ABSORBED heat.

23. Which of the following equations is correctly balanced and represents an an exothermic reaction?

heat in products

D

A $C_6H_{12}O_6\,(g) + O_{2(g)} + \text{heat} \rightarrow 6\,CO_{2(g)} + 6\,H_2O_{(g)}$

B $C_6H_{12}O_6\,(g) + O_{2(g)} \rightarrow 6\,CO_{2(g)} + 6\,H_2O_{(g)} + \text{heat}$

C $C_6H_{12}O_6\,(g) + 6\,O_{2(g)} + \text{heat} \rightarrow 6\,CO_{2(g)} + 6\,H_2O_{(g)}$

D $C_6H_{12}O_6\,(g) + 6\,O_{2(g)} \rightarrow 6\,CO_{2(g)} + 6\,H_2O_{(g)} + \text{heat}$

24. This WHMIS symbol is used to label a material that is _____.

C

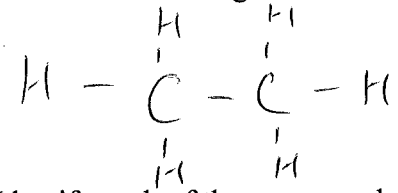
A Flammable
B Corrosive
C Biohazardous
D Carcinogenic

think: Zombie movies

Written Response (26 marks)

1. Draw the lewis diagram for the covalent compound C_2H_6 (2 marks)

look for stable octet →



C: 8 v.e. H 6 v.e.

14 e⁻ total. All used in bonds.

2. Identify each of the compounds as either **ionic (I)** or **covalent (C)**, then name the compound or give the chemical formula (1 mark each)

a. Al_2S_3	I	aluminum sulfide
b. N_2O_4	C	dinitrogen tetroxide
c. $Pb_3(PO_4)_2$	I	lead (ii) phosphate
d. Lithium oxide	I	Li_2O
e. Hydrogen	C	H_2
f. Tin(iv) fluoride	I	SnF_4
g. Sulfur dioxide	C	SO_2

3. Identify three things that are wrong with this out-of-control science lab, then write how you would make it a safer place to work in. (3 marks)

i)

ii)

iii)

There are many things wrong with this picture.

4. Balance the following chemical reactions (1 mark each)

a. The combustion of ethene:

$$1\ C_2H_4 + 3\ O_2 \rightarrow 2\ CO_2 + 2\ H_2O$$

b. The synthesis of phosphorus trifluoride:

$$1\ P_4 + 6\ F_2 \rightarrow 4\ PF_3$$

4. Rewrite the **word** equation to make a **balanced** chemical equation (2 marks each)

a. Calcium sulfate and aluminum bromide **react** to make calcium bromide and aluminum sulfate.

$$3\ CaSO_4 + 2AlBr_3 \rightarrow 3CaBr_2 + Al_2(SO_4)_3$$

b. Sodium + calcium fluoride **react** to make sodium fluoride and calcium.

$$2\ Na + CaF_2 \rightarrow 2\ NaF + Ca$$

c. Lithium and oxygen **react** to make lithium oxide

$$4\ Li + O_2 \rightarrow 2\ Li_2O$$

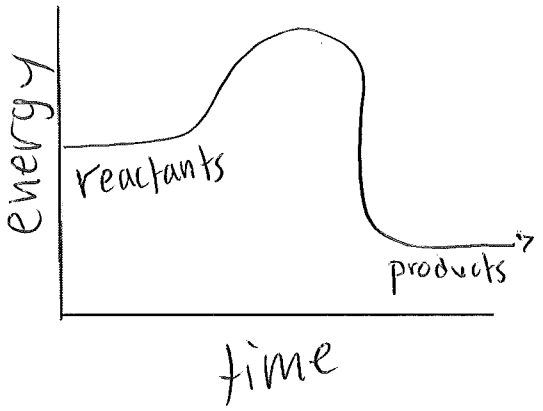
5. Classify the reaction, predict the products and balance. (1.5 marks each)

a. $1\ F_2 + 1\ Ba \rightarrow 1\ BaF_2$ Synthesis

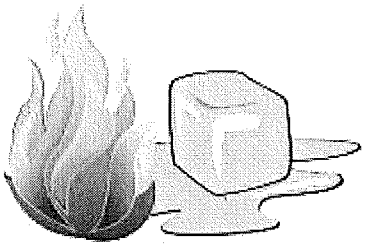
b. $4\ FeCl_3 + 3\ O_2 \rightarrow 2\ Fe_2O_3 + 6\ Cl_2$ Single replacement

6. You have just added two unknown chemicals together and have noticed that the surroundings feel warmer.

   Sketch a potential energy diagram labeling the **axes**, and on the graph, the **reactants and products.** Indicate if it is **endothermic** or **exothermic**. (3 marks)



EXOTHERMIC



The End