KU = 19 /20	TI = 9$\frac{1}{2}$ /14 + 7 /7 = 16$\frac{1}{2}$/21	Com = 10 /12	App = 8$\frac{1}{2}$ /10

9 + 10

The Activity Series
MOST REACTIVE Li>K>Ba>Ca>Na>Mg>Al>Zn>Fe>Ni>Sn>Pb>H>Cu>Ag>Au LEAST REACTIVE
F>Cl>Br>I

Part A: Knowledge & Understanding

1. MULTIPLE CHOICE: Please answer all questions on your scantron card in pencil. (10 marks)

2. Balance the following reactions AND identify the type of reaction occurring. (10 marks)

a. $2 NO_{2(g)} \rightarrow 1 N_{2(g)} + 2 O_{2(g)}$ TYPE: decomposition

b. $2 C_{10}H_{22(\ell)} + 31 O_{2(g)} \rightarrow 20 CO_{2(g)} + 22 H_2O_{(g)}$ TYPE: combustion

c. $2 HClO_{4(aq)} + 1 Ca(OH)_{2(aq)} \rightarrow 1 Ca ClO_{4(aq)} + 2 H_2O_{(l)}$ TYPE: neutralization   (10)

d. $1 NH_{3(g)} + 1 HCl_{(g)} \rightarrow 1 NH_4Cl_{(s)}$ TYPE: synthesis

e. $1 AlCl_{3(aq)} + 1 (NH_4)_3PO_{4(aq)} \rightarrow 1 AlPO_{4(s)} + 3 NH_4Cl_{(aq)}$ TYPE: double displacement

Part B: Thinking & Investigation and Communication

non me

1.a) Write a word equation, a skeleton equation and a balanced equation for the reaction in which sulfuric acid is formed when sulfur trioxide reacts with water. (3 marks C)

Word Equation: Sulfur trioxide + water → Sulphuric acid

Skeleton Equation: $SO_3 + H_2O \rightarrow H_2SO_4$ (3)

already balanced

Balanced Equation: $SO_{3(g)} + H_2O_{(aq)} \rightarrow H_2SO_{4(aq)}$

b) Write a word equation, a skeleton equation and a balanced equation for the reaction in which magnesium reacts with hydrochloric acid to form magnesium chloride and a gas as a product. (3 marks C)
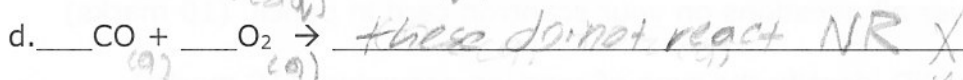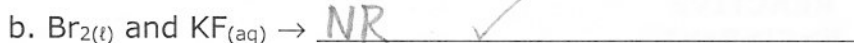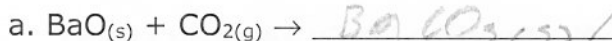
Word Equation: magnesium + hydrochloric acid → magnesium chloride + hydrogen gas

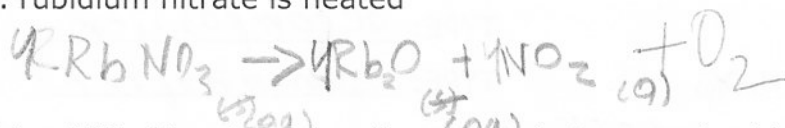**Skeleton Equation:** $Mg + HCl \rightarrow MgCl + H_2$ (3c)

Balanced Equation: $2Mg_{(s)} + 2HCl_{(aq)} \rightarrow 2MgCl_{(aq)} + H_{2(g)}$

$H_2O + CO_2$
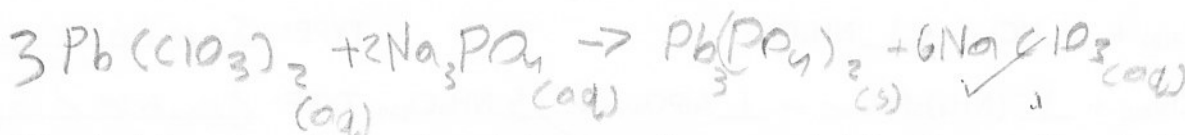
2. Predict the **reactants or p_____** for the following reactions (if possible). If the reaction IS POSSIBLE, write a _____ equation (reactants AND products) <u>with states</u> (6 marks TI). If there is no r_____ NR. (6 marks TI, 6 marks C)

a. $BaO_{(s)} + CO_{2(g)} \rightarrow$ ___$BaCO_{3(s)}$___ already balanced

b. $Br_{2(l)}$ and $KF_{(aq)} \rightarrow$ NR ✓

c. ___$Pb(NO_3)_2 + 2KCl_{(aq)}$___ $\rightarrow PbCl_{2(s)} + 2KNO_{3(aq)}$

d. ___CO + ___$O_2 \rightarrow$ ~~these do not react~~ NR ✗

e. rubidium nitrate is heated

$4 \cdot RbNO_3 \rightarrow 4Rb_2O + 4NO_2 {}_{(g)} + O_2$

f. lead(II) chlorate and sodium phosphate are mixed together

$3Pb(ClO_3)_2 {}_{(aq)} + 2Na_3PO_4 {}_{(aq)} \rightarrow Pb_3(PO_4)_2 {}_{(s)} + 6NaClO_3 {}_{(aq)}$

(margin notes:)
NO₃ 2 1 2
K 1 2
Pb 1 1
Cl 1 2
gas + gas → NR
Bromine can't displ...
+ fluorine potassium
metal oxide + non metal oxide → ? -2 marks
HT + 4C

3. A student heats 1.8 g of sodium carbonate in a reaction vessel. After the reaction, 0.45 g of solid sodium oxide is left.
   a) What type of reaction is occurring? (1 mark TI) $NaCO_3 \rightarrow NaO + ?$
   decomposition ✓   (TI)

   b) What are the products formed? (1 marks TI)
   sodium oxide and carbon dioxide gas (2 TI)   (5T)

   c) Write a balanced chemical equation for this reaction. (2 marks TI)
   $Na_2CO_3 {}_{(aq)} \rightarrow Na_2O_{(s)} + CO_2 {}_{(g)}$ no balancing required (TI)
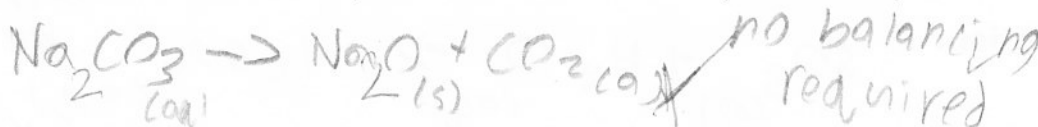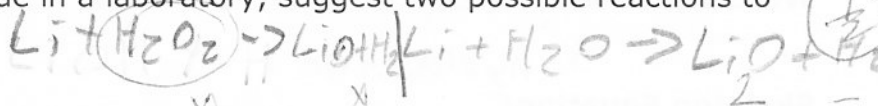
   d) What is the mass of the second product? (1 mark TI)
   $1.8 - 0.45 = 1.35g$ ✓
   So The mass of carbon dioxide is 1.35g.   (TI)

4. A chemist wants to prepare lithium oxide in a laboratory, suggest two possible reactions to make it. (2 marks TI)   LiO
$Li + H_2O_2 \rightarrow LiOH$ ✗ $Li + H_2O \rightarrow Li_2O$

You could react lithium with hydrogen peroxide as lithium is reactive enough to displace acids or ...

could react lithium with cold water as lithium is the most reactive and can displace coldwater.

Unit 2 Test C– Chemical Reactions

Application

1.Instead of releasing the sulfur trioxide gas produced during metal refining into the environment, the company decides to convert it to sulfuric acid.

a. Give balanced chemical equations that can be used to convert sulfur trioxide to sulfuric acid. (3 marks A)

$$SO_3 + ? \longrightarrow H_2SO_4$$

$$SO_{3(g)} + H_2O_{(aa)} \longrightarrow H_2SO_{4(aq)}$$

no balancing required ③
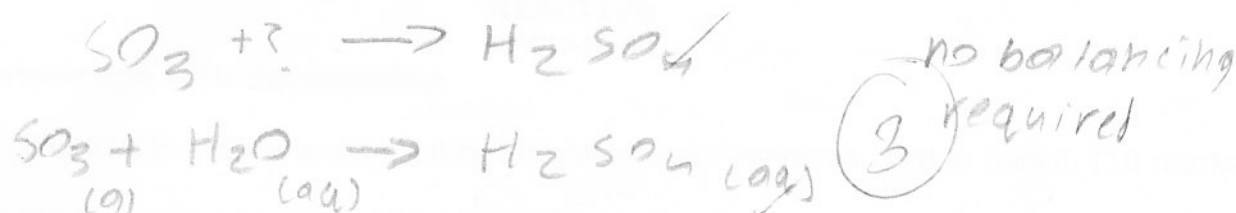
b. What is an environmental benefit of this process? (2 marks A)

Sulfur trioxide when released into the atmosphere creates acid rain by converting to sulfuric aq. It prevents this terrible product of metal refining.

2.A smoker lighted a cigarette that came in contact with liquid propane C_3H_8.

a) Write the possible balanced chemical equation for the reaction that took place. (3 marks A)

$$C_3H_{8(l)} + 5O_{2(g)} \longrightarrow 3CO_{2(g)} + 4H_2O_{(g)} + energy$$

C 3 + 3 *
H 8 = 8
O 2 = 7 | 10
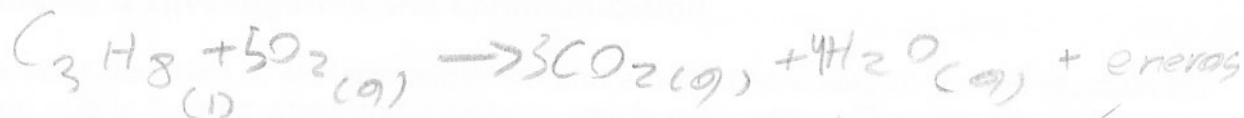
③

b) Explain why is it very dangerous to smoke when refuelling an automobile? (2 marks A)

Gasoline and propane are highly flammable and combustible as they are hydrocarbons. 1½ If a small flame were to interact with these chemical it would cause combustion. since a gas station is full of hydrocarbons the combus would spread causing a massive combustion reaction.

B.S   what will h due to ombusting