1. a) $Pb(NO_3)_{2(aq)} + Li_2S_{(aq)} \longrightarrow PbS_{(s)} + 2LiNO_{3(aq)}$

b) The reaction will occur as there is a solid precipitate.

2. A: Magnesium B: Iron(III) Sulfate

b) The reaction occurs because magnesium is more reactive than iron.

$3Mg_{(s)} + Fe_2(SO_4)_{3(aq)} \longrightarrow 2Fe_{(s)} + 3MgSO_{4(aq)}$

3. $Fe_2O_{3(s)} + \underset{L.R}{3CO} \longrightarrow 2Fe + 3CO_2$

167g $\div$ 159.7g/mol = 1.046mol

85.8g $\div$ 28.01g/mol = 3.05mol

$1.046mol_{Fe_2O_3} \times \frac{3CO}{1Fe_2O_3} = 3.13mol_{3CO}$

a) using all the Fe_2O_3 requires more CO than available
∴ CO is the limiting reactant

$3.05mol_{CO} \times \frac{2Fe}{3CO} = 2.033mol\ Fe$

$\times$ 55.85g/mol

= 113.54g

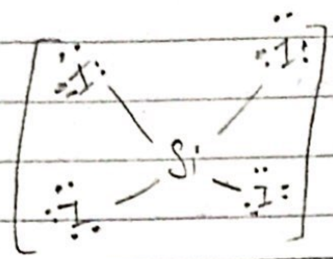
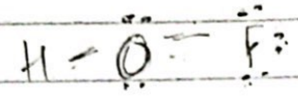
b) ∴ 114g of iron is produced

c) % yield = $\frac{\text{actual}}{\text{theoretical}} \times 100$

$= \frac{52.3g}{114g} \times 100$

= 45.9%

∴ the % yield is about 45.9%

Compound	Lewis Structure	Polarity
SiI_4 +7(4) = 32$\bar{e}$		2.2 - 1.8 = 0.4 Non-poler Only london dispersion forces
HOF 1+6+7 = 14		H - O - F 3.5-2.1 = 1.4 4.1-3.5 = 0.6 O H F O poler bonds → don't cancel out ∴ polar molecule

5. SiI_4

a. Dipole-dipole forces are forces caused polar molecules. It occurs when the negative end of one molecule attracts the positive end of another.

London Dispersion Forces are caused the movement of electrons. If there are more electrons on one end of the molecule, it becomes slightly more negative, forming a dipole.

A hydrogen bond is a very strong dipole-dipole force. It must have hydrogen bonded with either fluorine, oxygen, or nitrogen.

b. In SiI_4 only LDF is present

c. the molecule is non-polar as there as no polar bonds. This eliminates the possibility of dipole-dipole or hydrogen bond forces. All molecules have LDFs since all they require is electrons. Therefore SiI_4 has LDFs.

6. $C_1V_1 = C_2V_2$

$1.5(V_1) = 6(2.0)$

$V_1 = 12/1.5$

$V_1 = 8.0L$

$\therefore$ 6.0L of water must be added to change the concentration to 1.5 mol/L. 8.0L is needed in total, and the solution already contains 2.0L.

7. $2HCl_{(aq)} + Ba(OH)_{2(aq)} \rightarrow 2HOH_{(l)} + BaCl_{2(aq)}$

0.610 mol/L

0.0310 L × 0.82 mol/L = 0.02542 mol

0.02542 $mol_{Ba(OH)_2}$ × 2_{HCl} = 0.05084 mol_{HCl}

0.05084 mol ÷ 0.610 mol/L = 0.0833 L

$\therefore$ About 83 mL of HCl is required to neutralize the $Ba(OH)_2$

8. KOH + HCl → HOH + KCl

0.500 M   25.0 mL

V = 35.7 mL   ? M

− 5.5 mL

= 30.2 mL

0.0302 L × 0.500 M = 0.0151 mol

0.0151 mol_{KOH} × $\frac{1}{1}$ = 0.0151 mol_{HCl}

0.0151 mol ÷ 0.025 L = 0.604 M

$\therefore$ The concentration of the hydrochloric acid solution was about 0.604 M.