Chemistry 2202 Common Exam June 2012

Constructed Response Answer Key

41. (a) mol CO_2 = v ÷ V

= 36.4 L ÷ 22.4 L/mol

= 1.625 mol **(1 Mark)**

Molecules CO_2 = mol x N_A

= 1.625 mol x 6.02×10^{23} molecules/mol

= 9.78×10^{23} molecules CO_2 **(1 Mark)**

41. (b) Assume 100g sample

mol_C = 60.00g ÷ 12.01 g/mol = 4.9958 mol

mol_H = 4.485g ÷ 1.01 g/mol = 4.4406 mol

mol_O = 35.52g ÷ 16.00 g/mol = 2.22 mol **(1.5 Mark)**

Divide each by lowest amount:

$(C_{4.9958}H_{4.4406}O_{2.22}) \div 2.22$

$C_{2.25}H_2O_1$ **(1 Mark)**

Multiply by 4 to get empirical formula

$C_9H_8O_4$ **(0.5 Mark)**

NOTE: Other methods acceptable

41. (c) mol $K_2Cr_2O_7$ = c x v

= 0.150 mol/L x 0.250 L

= 0.0375 mol **(1 Mark)**

mass $K_2Cr_2O_7$ = n x M

= 0.0375 mol x 294.20 g/mol

= 11.0 g **(1 Mark)**

41. (d) Many acceptable answers: **(1 Mark for each answer)**

- inaccurate weighing of solute
- inaccurate addition of water (meniscus)
- contaminated/wet glassware or equipment
- any other acceptable answer

41. (e) Vf = 25.0 mL + 500.0 mL

= 525.0 mL **(0.5 Mark)**

CiVi = CfVf

Cf= (CiVi) ÷ Vf

= (1.74 mol/L)(0.025L) ÷ (0.525L) **(0.5 Mark)**

= 0.0829 mol/L **(1 Mark)**

41. (f) Determine mol of each reactant:

mol $_{Zn}$ = m ÷ M

= 2.00 g ÷ 65.38 g/mol

= 0.03059 mol Zn **(1 Mark)**

mol $_{AgNO_3}$ = c x v

= 0.200 mol/L x 0.100 L

= 0.0200 mol $AgNO_3$ **(1 Mark)**

Determine Limiting Reagent

0.03059 mol Zn x $\frac{2\ Ag}{1\ Zn}$ = 0.0611 mol Ag **(0.5 Mark)**

0.0200 mol $AgNO_3$ x $\frac{2\ Ag}{2\ AgNO3}$ = 0.0200 mol Ag **(0.5 Mark)**

Limiting reagent is $AgNO_3$ but not required to state for marks.

Calculate mass of Ag

$m = n \times M$

$= (0.0200\text{mol}) \times (107.87\ \text{g/mol})$

$= 2.16\ \text{g Ag}$ **(1 Mark)**

41. (g) A – $CHCl_3$ – Polar, thus soluble. No conductivity because molecular.

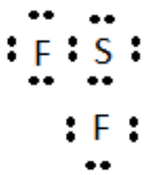
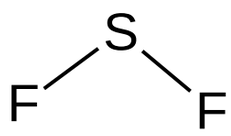
B – $AlCl_3$ – High solubility (solubility table). Thus, high conductivity.

C – $PbCl_2$ – Low solubility (solubility table). Thus low conductivity.

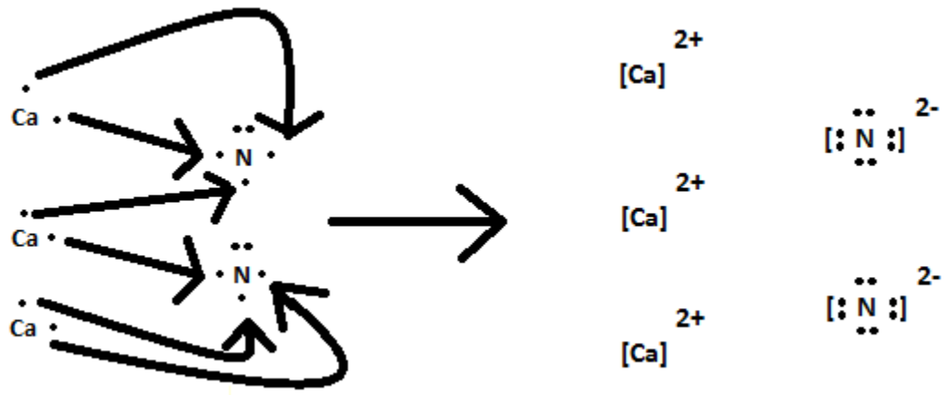
NOTE: 0.5 Mark for identifying each substance.

0.5 Mark for each explanation.

42. (a)

Lewis Diagram	 **(1 Mark)**
VSEPR Shape Diagram	 **(1 Mark)**
VSEPR Shape Name	V-Shaped or Bent **(1 Mark)**

42. (b)



(1 Mark) **(0.5 Mark)**

Formula is : Ca_3N_2

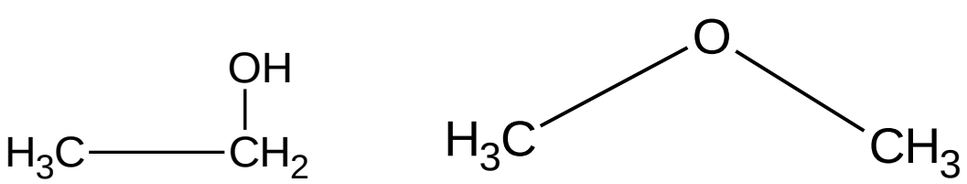
(0.5 Mark)

42. (c) Fluorine < Ammonia < Sodium chloride < Silicon dioxide **(1 Mark for Order)**

LDF	LDF	Ionic	Network covalent
	D-D		
	H-Bonding		

(0.5 Marks for each substance justification)

42. (d)



Alcohol

- LDF (same)
- Polar (D-D forces)
- H-Bonds

Ether

- LDF (same)
- Polar (D-D forces)

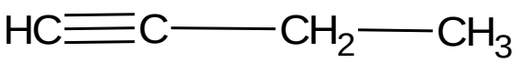
Alcohol will have higher boiling point because of greater intermolecular forces (H-Bonds)

(1 Mark For each diagram)

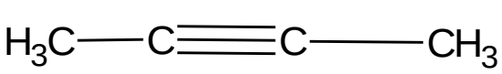
(0.5 Mark for identifying forces in each compound)

(1 Mark for conclusion)

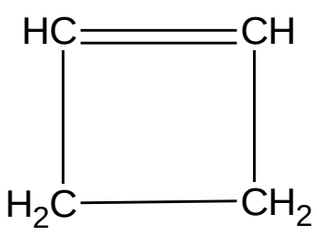
43. (a) POSSIBLE STRUCTURES:



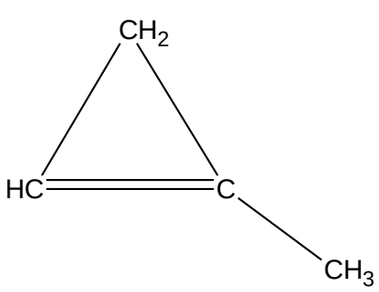
1-butyne



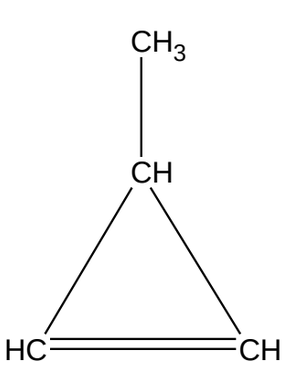
2-butyne



cyclobutene



1-methylcyclopropene

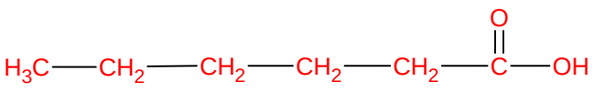
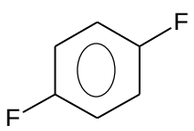
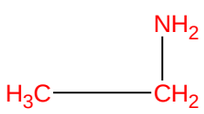


3-methylcyclopropene

(1 Mark for each diagram)

(1 Mark for each name)

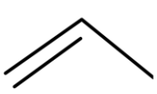
43. (b)

IUPAC Name	Structural Diagram
Hexanoic acid	
1,4-difluorobenzene	
Ethanamine	

(1 Mark Each)

44. (c)

Compound "A"

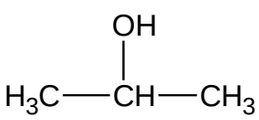


$+ H_2O(\ell) \longrightarrow$

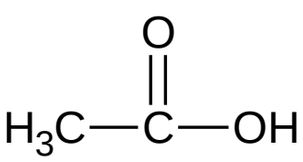
Isomer 1

Compound "B"

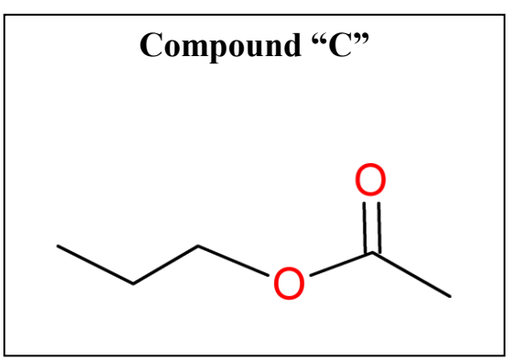
Isomer 2



$+$



$+$



$+ H_2O(\ell)$

(1 Mark for each structure)

(All types of diagrams accepted)