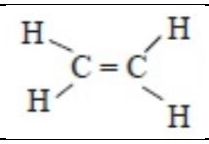
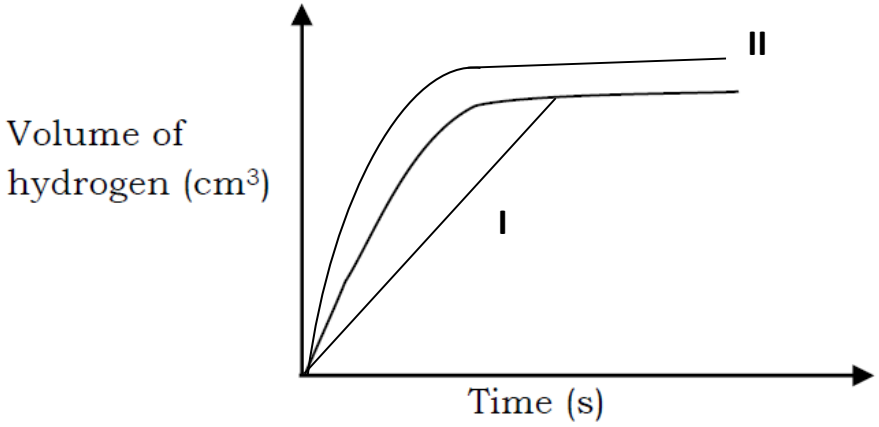
KENYA HIGH SCHOOL

THE NATIONAL CHEMISTRY CONTEST 1ST EDITION

FORM 4

Chemistry Marking Scheme

QUESTION		ANSWER	MARKS
1.	(a)	$3Fe_{(s)} + 4H_2O_{(g)} \rightarrow Fe_3O_{4(s)} + 4H_{2(g)}$	(1 mks)
	(b)	$Fe_3O_{4(s)} + 8HCl_{(aq)} \rightarrow 4H_2O_{(l)} + 2FeCl_{3(aq)} + FeCl_{2(aq)}$	(1 mks)
2.		It has a bigger surface area which spreads heat energy.	($^1/_2$ mks)
3.	(a)	It could crack.	($^1/_2$ mks)
	(b)	To prevent the gas from coming out of the flask.	($^1/_2$ mks)
	(c)	To prevent the gas from coming out of the flask.	($^1/_2$ mks)
4.		**-250.5 ºC** **432cm^3**	(1 mks)
5.		Element Z	(1 mks)
6.		• To 2M sodium hydroxide solution, add an equal volume of 2M sulphuric (VI) acid solution while stirring. • Heat the solution to saturation and allow it to cool for crystals to form. • Dry between filter papers.	(3 mks)
7.		128	(1 mks)
8.		Increase in temperature **increases** the pressure of the gas/ temperature is **directly proportional** to the pressure of the gas.	($^1/_2$ mks)
9.	(a)	**$RCOO^-Na^+$** - Soapy **$ROSO_3^-Na^+$** - Soapless	(1 mks)
	(b)	**$ROSO_3^-Na^+$ /** Soapless This is because the agent d**oes not form scum/insoluble ppt** with water containing Ca^{2+}/Mg^{2+}.	(1 mks)
10.	(a)	Molecular Formula C_2H_4	(1 mks)
	(b)(i)		($^1/_2$ mks)
	(ii)	$C_2H_4 + HOBr \rightarrow CH_2OHCH_2Br$	(1 mks)
	(c)(i)	Acidified potassium manganate (VII)	(1 mks)
	(ii)	Purple colour of acidified potassium manganate (VII) changes to colourless.	(1 mks)

11.	(i)	Polyethene/polythene	($^1/_2$ mks)
	(ii)	Rubber	($^1/_2$ mks)
12.		G-No effervescence H- Effervescence	(1 mks)
13.		In dilute sulphuric (VI) acid, the acid dissociates completely forming higher number of hydrogen ions.	(1 mks)
14.		• The particles may not have the necessary activation energy. • The particles may collide in the wrong orientation.	(1 mks)
15.		• The position of the equilibrium **shifts to the left**. • This is because increase in pressure favours the **direction with fewer numbers** of gaseous molecules.	(2 mks)
16.	(i)	**ON THE GRAPH**	($^1/_2$ mks)
	(ii)		($^1/_2$ mks)
17.	(a)(i)	-183.4kJ	(1 mks)
	(ii)	$4.48dm^3$	(1 mks)
	(b)	-358kJ/mol	(1 mks)
	(c)	Some of the heat energy generated is used to dissociate the acid molecules before neutralization occurs.	(1 mks)
18.	(a)	86.6%	(1 mks)
	(b)	10.4g	(1 mks)
19.	(a)	37.1%	(1 mks)
	(b)	82%	(1 mks)
20.	(a)	• $S_{(s)} + O_{2\ (g)} \rightarrow SO_{2\ (g)}$ • $2ZnS_{(s)} + 3O_{2(g)} \rightarrow 2ZnO_{(s)} + 2SO_{2(g)}$ • $2PbS_{(s)} + 3O_{2(g)} \rightarrow 2PbO_{(s)} + 2SO_{2(g)}$ • $4FeS_{2(s)} + 11O_{2(g)} \rightarrow 2Fe_2O_{3(s)} + 8SO_{2(g)}$	(1 mks)
	(b)	To remove the impurities which poison/reduces surface area of the catalyst	(1 mks)
	(c) (i)	Concentrated sulphuric (VI) acid	(1 mks)
	(ii)	• Vanadium (V) oxide • Platinum	($^1/_2$ mks)

	(d)	• Sulphur (VI) oxide gas is dissolved in concentrated sulphuric (VI) acid to form oleum. • The oleum is diluted with water to form concentrated sulphuric (VI) acid	(1 mks)
	(e)(i)	$2SO_{2\,(g)} + O_{2\,(g)} \rightarrow 2SO_{3\,(g)}$	(1 mks)
	(ii)	• High temperature 450-500^oC • Presence of a catalyst: Vanadium (V) oxide/ Platinum • Pressure 2-3atm	(1 mks)
21.	(a)	Aluminium chloride	($^1/_2$ mks)
	(b)	$2Al_{(s)} + 3Cl_{2(g)} \rightarrow 2AlCl_{3(s)}$	(1 mks)
	(c)	Prevent **entry** of moisture.	(1 mks)
	(d)	Calcium oxide.	($^1/_2$ mks)
	(e)	It prevents emission of chlorine gas/pollution of chlorine.	($^1/_2$ mks)
	(f)	Iron metal.	($^1/_2$ mks)
	(g)	It sublimes	($^1/_2$ mks)
	(h)	$2P_{(s)} + 3Cl_{2(g)} \rightarrow 2PCl_{3(s)}$	(1 mks)
22.	(a) (i)	B and E	($^1/_2$ mks)
	(ii)	B	($^1/_2$ mks)
	(b) (i)	B	($^1/_2$ mks)
	(ii)	A	($^1/_2$ mks)
	(c)(i)	A	($^1/_2$ mks)
	(ii)	C	($^1/_2$ mks)
	(iii)	E	($^1/_2$ mks)
	(iv)	Above	($^1/_2$ mks)
	(d) (i)	D	($^1/_2$ mks)
	(ii)	F	($^1/_2$ mks)
23.	(a)	**Observation** / **Inference** • No effervescence • White ppt SO_4^{2-} **present**	(2 mks)
	(b)	**Observation** / **Inference** White ppt soluble in excess Al^{3+} , Zn^{2+} **present**	(2 mks)
	(c)	**Observation** / **Inference** White ppt insoluble in excess Al^{3+} **present**	(2 mks)
TOTAL			**55**