

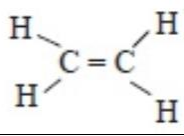


KENYA HIGH SCHOOL

THE NATIONAL CHEMISTRY CONTEST 1ST EDITION

FORM 4

Chemistry Marking Scheme

QUESTION	ANSWER	MARKS
1.	(a) $3\text{Fe}_{(s)} + 4\text{H}_2\text{O}_{(g)} \rightarrow \text{Fe}_3\text{O}_{4(s)} + 4\text{H}_{2(g)}$	(1 mks)
	(b) $\text{Fe}_3\text{O}_{4(s)} + 8\text{HCl}_{(aq)} \rightarrow 4\text{H}_2\text{O}_{(l)} + 2\text{FeCl}_{3(aq)} + \text{FeCl}_{2(aq)}$	(1 mks)
2.	It has a bigger surface area which spreads heat energy.	($\frac{1}{2}$ mks)
3.	(a) It could crack.	($\frac{1}{2}$ mks)
	(b) To prevent the gas from coming out of the flask.	($\frac{1}{2}$ mks)
	(c) To prevent the gas from coming out of the flask.	($\frac{1}{2}$ mks)
4.	-250.5°C 432cm^3	(1 mks)
5.	Element Z	(1 mks)
6.	<ul style="list-style-type: none">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.	($\frac{1}{2}$ mks)
9.	(a) RCOO^-Na^+ - Soapy $\text{ROSO}_3^-\text{Na}^+$ - Soapless	(1 mks)
	(b) $\text{ROSO}_3^-\text{Na}^+$ / Soapless This is because the agent does not form scum/insoluble ppt with water containing $\text{Ca}^{2+}/\text{Mg}^{2+}$.	(1 mks)
10.	(a) Molecular Formula C_2H_4	(1 mks)
	(b)(i) 	($\frac{1}{2}$ mks)
	(ii) $\text{C}_2\text{H}_4 + \text{HOBr} \rightarrow \text{CH}_2\text{OHCH}_2\text{Br}$	(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	($\frac{1}{2}$ mks)
	(ii)	Rubber	($\frac{1}{2}$ 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.		<ul style="list-style-type: none"> The particles may not have the necessary activation energy. The particles may collide in the wrong orientation. 	(1 mks)
15.		<ul style="list-style-type: none"> 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)	<p>ON THE GRAPH</p> <p>Volume of hydrogen (cm³)</p> <p>Time (s)</p>	($\frac{1}{2}$ mks)
	(ii)		($\frac{1}{2}$ 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)	<ul style="list-style-type: none"> $S_{(s)} + O_{2(g)} \rightarrow SO_{2(g)}$ $2ZnS_{(s)} + 3O_{2(g)} \rightarrow 2ZnO_{(s)} + 2SO_{2(g)}$ $2PbS_{(s)} + 3O_{2(g)} \rightarrow 2PbO_{(s)} + 2SO_{2(g)}$ $4FeS_{2(s)} + 11O_{2(g)} \rightarrow 2Fe_2O_{3(s)} + 8SO_{2(g)}$ 	(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)	<ul style="list-style-type: none"> Vanadium (V) oxide Platinum 	($\frac{1}{2}$ mks)



	(d)	<ul style="list-style-type: none"> • 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)	$2\text{SO}_{2(g)} + \text{O}_{2(g)} \rightarrow 2\text{SO}_{3(g)}$	(1 mks)	
	(ii)	<ul style="list-style-type: none"> • High temperature 450-500°C • Presence of a catalyst: Vanadium (V) oxide/ Platinum • Pressure 2-3atm 	(1 mks)	
21.	(a)	Aluminium chloride	(1/2 mks)	
	(b)	$2\text{Al}_{(s)} + 3\text{Cl}_{2(g)} \rightarrow 2\text{AlCl}_{3(s)}$	(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)	$2\text{P}_{(s)} + 3\text{Cl}_{2(g)} \rightarrow 2\text{PCl}_{3(s)}$	(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	(2 mks)
		<ul style="list-style-type: none"> • No effervescence • White ppt 	SO_4^{2-} present	
(b)	Observation	Inference	(2 mks)	
	White ppt soluble in excess	Al^{3+} , Zn^{2+} present		
(c)	Observation	Inference	(2 mks)	
	White ppt insoluble in excess	Al^{3+} present		
TOTAL			55	

