LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA
DEPARTMENT OF
EDUCATION

CAPRICORN NORTH DISTRICT

PHYSICAL SCIENCES

GRADE 11 CONTROLLED TEST 2
MARKING GUIDELINE

SEPTEMBER 2023

Stanmorephysics

MARKS: 100

QUESTION 1

1.1 D✓✓
1.2 D✓✓
1.3 B✓✓
1.4 B✓✓
1.5 C✓✓
1.6 D✓✓ **[12]**

QUESTION 2

2.1 Empirical formula is the simplest whole number ratio of the elements that make up a compound. ✓✓ (2)

2.2

ELEMENT	MASS (g)	$n=\frac{m}{M}$ (mol)		Ratio
C	40	$\frac{40}{12}$=3.33✓	$\frac{3.33}{3.33}$	1
H	6.67	$\frac{6.67}{1}$=6.67✓	$\frac{6.67}{3.33}$	2
O	53.33	$\frac{53.33}{16}$=3.33✓	$\frac{3.33}{3.33}$	1
	✓		✓	✓

CH_2O✓ (7)

2.3 M_{CH2O} = 12+ 2 +16 = 30g.mol^{-1}✓

$\frac{180}{30}$ =6 ✓

Molecular formula:$C_6H_{12}O_6$ ✓ (3)
[12]

QUESTION 3

3.1 One mole is the amount of a substance having the same number of particles as there are atoms in 12g of carbon-12 ✓✓ (2)

3.2.1 $n_{NaOH} = \frac{m✓}{M}$

$= \frac{3✓}{40}$
= 0.075mol ✓

$\frac{n_{NaOH}}{n_{H2SO4}} = \frac{2}{1}$

$\frac{0.075}{n_{H2SO4}} = \frac{2}{1}$

$\therefore\ n_{H2SO4}$ =0.0375mol ✓ (for using ratio)

$c = \frac{n}{V}$

$0.05 = \frac{0.0375✓}{V}$

V= 0.75 dm^3✓ (6)

3.2.2 1.35-0.75=0.6 dm^3✓

$c = \frac{n✓}{V}$

$0.05 = \frac{n✓}{0.6}$

n = 0.03 mol.

$\frac{n_{CaCO3}}{n_{H2SO4}} = \frac{1}{1}$

$\therefore\ n_{CaCO3} = 0.03$mol ✓

$n_{CaCO3} = \frac{m}{M}$

$0.03 = \frac{m}{100✓}$

m = 3g✓ (6)

3.2.3 $\%purity = \frac{mass\ of\ pure\ substance}{mass\ of\ sample} \times 100✓$

$\%purity = \frac{3}{7} \times 100✓$

$\%purity = 42.85\%✓$ (3)

[17]

QUESTION 4

4.1 $2Ag_2O_{(s)} + C_{(s)} \rightarrow 4Ag_{(s)} + CO_{2(g)}$ ✓ ✓ (2)

4.2.1 $n_{Ag2O} = \frac{m.✓}{M}$ $n_C = \frac{m}{M}$

$n_{Ag2O} = \frac{151.91✓}{232}$

$n_{Ag2O} = 0.65\ mol$

2 mol of Ag_2O reacts with 1 mol of C.

$\therefore Required\ n_c = 0.325mol$ 0.325>0.25 C is the limiting reagent (4)

✓

$n_C = \frac{3✓}{12}$

$n_C = 0.25mol$

4.2.2 $\frac{n_C}{n_{Ag}} = \frac{1}{4}$

$\frac{0.25}{n_{Ag}} = \frac{1}{4}$

$n_{Ag} = 1mol$ ✓

$n_{Ag} = \frac{m✓}{M}$

$1 = \frac{m✓}{108}$

m = 108g✓ (4)

4.2.3 $\%yeild = \frac{actual\ yeild}{theoretical\ yeild} \times 100✓$

$\%purity = \frac{92}{108} \times 100✓$

$\%purity = 85.18\%✓$ (3)

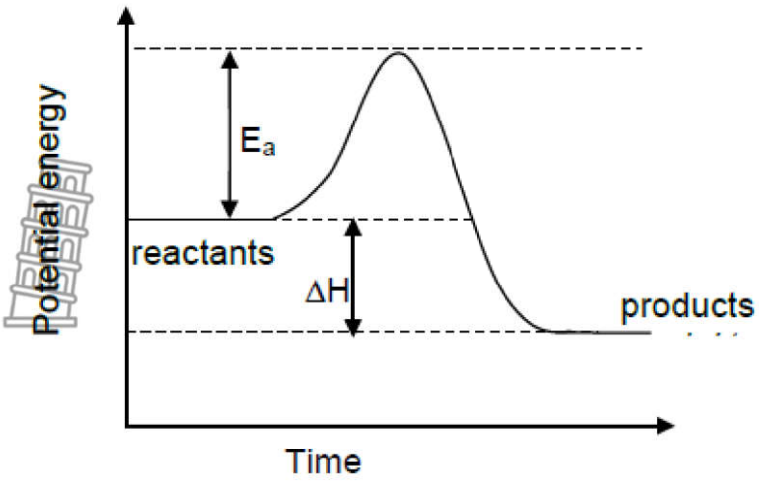
[13]

QUESTION 5

5.1 Activation energy is the minimum energy required for a reaction to take place.✓✓ (2)

5.2 Exothermic✓ ΔH< 0✓ (2)

5.3



Reactants and products in the correct place ✓ (3)
Heat of reaction correct ✓
Activation energy correct ✓

[7]

QUESTION 6

6.1 An ampholyte is a substance that can act as either an acid or a base. ✓✓ (2)

6.2.1 SO_4^{2-}✓ (1)

6.2.2 H_2SO_4 ✓ (1)

6.2.3 HSO_4^- ✓ (1)

6.3.1 A substance that ionizes in water to form hydrogen ions (H^+) ✓✓ (2)

6.3.2 $HCl(aq) + H_2O(l)$ ✓ → $H_3O^+_{(aq)} + Cl^-$ ✓ balanced ✓ (3)

6.3.3 $V_1c_1 = V_2c_2$ ✓ (3)
$0.02(0.5) = V_1 0.015$ ✓
$V_2 = 0.67\text{dm}^3$ ✓

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6.4.1
$$c_{KOH} = \frac{m✓}{MV}$$

$$c = \frac{6✓}{56(0.2)}$$

c= 0.54 mol.dm^{-3}

$\frac{n_a}{n_b} = \frac{c_a V_a}{c_b V_b}$ ✓ (6)

$\frac{1}{1}$ ✓ $= \frac{(0.54)(20)}{c_b 25}$ ✓

$c_b = 0.43 \text{ mol.dm}^{-3}$ ✓

[19]

QUESTION 7

7.1 Boyles Law states that the pressure of an enclosed gas is inversely proportional to the volume it occupies at constant temperature. ✓✓ (2)

7.2 $p \propto \frac{1}{V}$ ✓ (1)

7.3 Temperature✓ and Number of molecules (moles) of the gas. ✓ (2)

7.4 The pressure of a gas is the collision of the molecules with the walls of the container. ✓✓ (2)

7.5 $p_1 V_1 = p_2 V_2$✓ (4)
$90(3)$✓ $= p_2 5$✓
$p_2 = 54kPa$✓

7.6 Low pressure ✓ and High Temperature✓ (2)

7.7

Real Gas	**Ideal gas**	
Particles have a definite volume and a mass. ✓	Particles do not have a definite volume and mass. ✓	
Collisions between real gas molecules are inelastic. ✓	Collisions between molecules are elastic. ✓	
Kinetic energy of real gas molecules changes with collision. ✓	Kinetic energy of ideal gas partcles is constant. ✓	
There are intermolecular forces between the particles of a real gas.	There are no intermolecular forces between the particles of ideal gas.	(any 3x2=6)

7.8 At low temperatures the kinetic energy of the particles is low, this allows intermolecular forces to exist. ✓ (1)

[20]