education

Department:
Education
PROVINCE OF KWAZULU-NATAL

PHYSICAL SCIENCES P2 (CHEMISTRY)

COMMON TEST

JUNE 2019

MARKING GUIDELINE

NATIONAL SENIOR CERTIFICATE

GRADE 11

TIME: 2 hours

MARKS: 100

This marking guideline consists of 7 pages.

QUESTION 1

1.1. C ✓✓
1.2. B ✓✓
1.3. A ✓✓
1.4. D ✓✓
1.5. C ✓✓
1.6. B ✓✓
1.7. A ✓✓ 7x2 = (14)

QUESTION 2

2.1.1 A✓ and I✓ (2)

2.1.2. (B and F) ✓ ✓ OR (D and F) (2 or 0) (2)

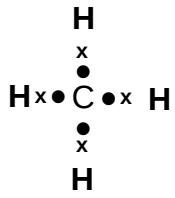
2.1.3. G ✓ (1)

2.1.4. G✓ (1)

2.1.5. C ✓ (1)

2.1.6. E ✓ (1)

2.2 H_2O has hydrogen bonding ✓and H_2S has dipole- dipole forces. ✓ The intermolecular forces in water are stronger ✓Therefore more energy is required to break the IMF in water. ✓ (4)

2.3.  ✓✓ (2)

2.4.1 NON- POLAR✓

- CO_2 is a symmetrical molecule with even distribution of electrons✓

There is no net dipole moment/dipoles cancel out✓/. There is no distinct opposite positive and negative ends. (3)

2.4.2 London forces ✓ (1)

[18]

QUESTION 3

3.1. Capillarity / height ✓ (1)

3.2. Nail polish remover✓ (1)

3.3. It has the weakest intermolecular forces /cohesive forces ✓ molecules separate easily. ✓ The adhesive forces are stronger than the cohesive forces/IMF ✓ (3)

3.4. Nail polish remover; water ; glycerine ✓✓ (2)

3.5 Glycerine✓ (1)

[8]

QUESTION 4

4.1.1 Charle's Law --✓ The volume of an enclosed gas is directly proportional to its Kelvin temperature provided the pressure is kept constant. ✓✓ (3)

4.1.2. Amount/mass of gas✓ (1)

4.1.3. volume is directly proportional to Kelvin temperature/ Vα T✓ / volume is linearly proportional to Celsius temperature

ACCEPT As temperature increases, volume increases. (1)

4.1.4. P_3 ✓ (1)

4.1.5 From pV = nRT , gradient which is V/T is equal to nR/P. ✓Since R and n are constant, ✓ Gradient is inversely proportional to the pressure/ higher pressure represents smaller gradient. ✓ (3)

OR

From Boyles law --- at a constant temperature, ✓ the gas with the highest volume will have the lowest pressure✓ pV = k✓

4.2.

OPTION 1

Change in pressure = 100-55 = 45kPa✓

pV = nRT✓

$\underline{45 \times 10^3 \times 10 \times 10^{-3}}$ ✓= n x $\underline{8.31 \times 298}$✓

n = 0.182mol✓

n = m/M✓

$\underline{0.182 = m/32}$✓

m = 5.824g ✓ of O_2 is lost

NB: ACCEPT p values in kPa with V values in dm^3

OPTION 2

pV = nRT✓

$\underline{100 \times 10^3 \times 10 \times 10^{-3} = n \times 8.31 \times 298}$✓

n= 0.404mol (original no. of moles of oxygen in vessel)

pV = nRT

$\underline{55 \times 10^3 \times 10 \times 10^{-3} = n \times 8.31 \times 298}$✓

n= 0.222mol (no of mol in vessel after leak is repaired)

no of moles of gas leaked
=0.404 – 0.222✓
= 0.182mol✓

n = m/M✓

$\underline{0.182 = m/32}$✓

m = 5.824g ✓ of O_2 is lost

(8)

[17]

QUESTION 5

5.1 Simplest whole number ratio in which elements in a compound combine ✓✓ (2)

5.2.

Element	Mass per 100 g	n=m/M(mol)	Simplest ratio
C	54.56	54.56/12 = 4.547✓	4.547/2.2725 = 2
H	9.08✓	9.08/1 = 9.08✓	9.08/2.2725 = 4 ✓
O	36.36	36.36/16 = 2.2725✓	2.2725/2.2725 = 1

Empirical formula is C_2H_4O✓ (6)

5.3 n = True M_r/ Empirical M_r

= 132/44

= 3✓

Molecular formula is $C_6H_{12}O_3$✓ (award both marks if answer correct without calculation) (2)

[10]

QUESTION 6

6.1. The amount of substance having the same number of particles as there are atoms in 12g of C-12. ✓✓/ Amount of substance having 6,02 x 10^{23} elementary particles. (2)

6.2.

$n = V/V_m$ ✓

$= \underline{63/22.4}$ ✓

$= 2.8125$ mol

$N = \underline{2.8125 \times 6.02 \times 10^{23}}$✓

$= 1.693 \times 10^{24}$ molecules✓ of CO_2

(4)

6.3

POSITIVE MARKING FROM 6.2

Fe : CO_2

2 : 3 ✓

$n_{Fe} = 2.8125 \times 2/3$

$= 1.875$mol✓

(4)

(2)

6.4.

Positive marking form 6.2/6.3

$CO_2 : Fe_2O_3$ **OR** Fe : Fe_2O_3

3 : 1 2 : 1

$nFe_2O_3 = 2.8125/3$✓ $nFe_2O_3 = 1.875/2$

$= 0.9375$ mol $= 0.9375$ mol

$mFe_2O_3 = nM$

$= \underline{0.9375 \times 160}$✓

$= 150$ g

% purity = $\underline{150/160 \times 100}$✓

= 93,75% ✓

(4)

[12]

QUESTION 7

7.1 Substance that is used up completely in a reaction. ✓ ✓ (2)

7.2

Ratio	**5**	**1**	**5**	**2**
Moles	*Ca*	*V_2O_5*	*CaO*	*V*
Initial	500✓	175 ✓	0	0
Change	500✓	100	500	200✓
End	0	75	500	200

Ca

n = m/M

= 20 000/40

= 500 mol

V_2O_5

n = m/M

= 31 850/182

= 175mol

n_V formed = 200 mol

m = nxM

= 200 x 51✓

= 10 200 g ✓ (6)

7.3 % yield = 8670/10 200 x 100✓

= 85 %✓ (2)

[10]

QUESTION 8

8.1 Amount of solute per litre of solution. ✓ ✓ (2)

8.2. n = m/M

= 4.14/69 ✓

= 0.06mol ✓ (2)

8.3 **Positive marking from 8.2.**

c = n/V✓

0.05 =0.06/V✓

V = 1,20 dm^3 ✓ (3)

8.4

Positive marking from 8.3

$c_1V_1 = c_2V_2$ ✓

0.05 x 1.20✓ = c_2 x 1.45✓

C_2 = 0.04 $mol.dm^{-3}$✓

Positive marking from 8.2. and 8.3

c = n/V✓

=0.06✓/1.45✓

c= 0.04 $mol.dm^{-3}$✓

(4)

[11]

TOTAL MARKS : 100