Hillcrest High School

PHYSICAL SCIENCE P2 memo

Nov 2023

Grade 10

MARKS: 134

TIME: 2 Hours

EXAMINER: Ms N. Badenhorst

MODERATOR: Mrs J. Knox-Whitehead

1.1 C

1.2 C

1.3 C

1.4 D/C

1.5 C

1.6 D

1.7 A

1.8 D

1.9 C

1.10 A

Question 2 – matter, homogeneous and heterogenous

2.1.1 Ductile√ (1)

2.1.2 malleable √ (1)

2.1.3 . Electrical conductor√ (1)

2.2.1 Sugar particles mix with water particles to form a sugar solution and there is no fixed ratio. √√/the boiling point is of the solution is different from either water or sugar/ the sugar can be separated from water. (2)

2.2.2 Homogeneous √ (1)

2.2.3 Individual particles of sugar are invisible. /There is one single phase/The Solution has the same appearance throughout/The solution is uniform. √ (2)

2.2.4 Physical change√ (1)

[9]

Question 3 – atom

3.1.1 Oxygen ✓ (1)

3.1.2 16 ✓ (1)

3.2.1 Anion ✓ (1)

3.2.2 -2 ✓ (1)

3.2.3 Neon/Ne ✓✓ (2)

3.2.4 oxide ✓✓ (2)

3.3.1 Isotopes are atoms of the same element having the same number of proton but different numbers of neutrons. ✓✓ (2)

3.3.2

$$\text{R.A.M} = \frac{\mathbf{M}^{39}\text{K} \times \%\text{ abundance}}{100\%} + \frac{\mathbf{M}^{41}\text{K} \times \%\text{ abundance}}{100\%}$$

$$39.00\checkmark = \frac{38.964 \times 93.258\%\checkmark}{100\%} + \frac{\mathbf{M}^{41}\text{K} \times 6.742\%\checkmark}{100\%}$$

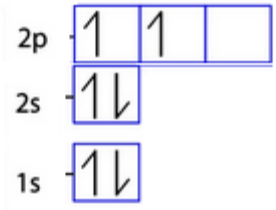
$$\mathbf{M}^{41}\text{K} = 39.544\ \text{g.mol}^{-1}\ /\text{amu}\ \checkmark$$

(4)

Question 4

	Number of protons	Number of neutrons	Number of electrons	Write the electron configuration/ sp-notation	Draw the Aufbau diagrams/ energy level diagrams	Number of valence electrons	Charge
C-13	4.1) 6	4.2) 7	4.3) 6		4.4) below		
Sodium ion	4.5) 11		4.6) 10				4.7) +1
Fluoride			4.8) 10	4.9) $1s^2 2s^2 2p^6$ or [Ne]		4.10) 8	4.11) -1

4.4)



Be careful when answering a question like this. Although in the original prac you did the independent was time and dependent was temp- in this particular question, based on the original statement ", investigates the relationship between the phase changes and the temperature" the independent and dependent changes

Question 5

5.1.1 What is the relationship between phase and temperature of a substance✓ (2)
5.1.2 Temperature✓ (1)
5.1.3 Phase change✓ (1)

5.2 The temperature at which the (saturation) vapour pressure of a liquid equals the atmospheric (ambient) pressure. (2)

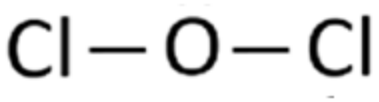
5.3.1 40°C✓ (1)
5.3.2 95°C✓ (1)

5.4.1 A✓ (1)
5.4.2 D✓ (1)
5.4.3 C✓ (1)
5.4.4 B✓ (1)

Question 6 – bonding

6.1.1 OCl_2 ✓
oxygen dichloride ✓ Or Dichlorine monoxide (2)

6.2 Covalent bond✓ (1)

6.3 

6.4 Ionic ✓ (1)

6.5 

(2)

Question was changed to 2 instead of 4 marks

Question 7 – endo/exo

7.1 Exothermic ✓
ΔH = energy of the products – energy of the reactants
ΔH = 100 - 200
ΔH = –100 kJmol^{-1} ✓ (2)

7.2
Ea = 1580 – 200
= 1380 kJmol^{-1} (1)

7.3 1480 kJmol^{-1} ✓ (1)

7.4 1240 kJmol^{-1} ✓ (1)
[5]

Question 8 – mole

8.1 a pure substance consisting of two or more different elements. (2)

8.2

$$\%Cr = \frac{MrCr_2}{MrK_2CrO_7} \times 100\%$$

$$\%Cr = \frac{104}{294} \checkmark \times 100\% \checkmark$$

$$\%Cr = 35,37\% \checkmark$$

(3)

8.3.1 The simplest whole-number ratio of atoms in a compound. ✓ (1)

8.3.2 %H = 100 – 65,31 – 32,65 = 2,04% ✓✓ (2)

8.3.3

	H	S	O	
Mass (g)	2,04	32,65	65,31	
M (g/mol)	1	32	16	
Mole = m/M	2,04	1.02	4,08	✓✓
Ratio	2	1	4	✓
	Empirical formula = H_2SO_4✓			

(4)

✓

8.4.1 Water changes into gas ✓ and leaves the (system) (2)

8.4.2 $n = \frac{m}{M}$ ✓

$$n = \frac{(6,257-4)}{18} \checkmark \checkmark$$

n = 0,13 mol ✓

Question 9 – mole

9.1.1 Concentration is the number of moles of solute per cubic decimeter of solution. ✓✓ (2)

9.1.2 **Burning splint** will make a pop sound (1)

9.1.3

Zn	+2 HCl
0,003 mol ÷ 2 x 1 ✓**m** = 0,0015 mol m = n.M✓ = 0,0015 (65) ✓ = 9,75 x 10^{-2} g ✓	n = c.V = 0,12 (0,025) ✓ = 0,003 mol

Zn	H2
0,2232 mol ÷ 1 x 1 ✓**m** = 0,2232 mol m = n.M✓ = 0,2232 (65) ✓ = 14,51 g ✓	n = $\frac{V}{Vm}$ = $\frac{5}{22,4}$ = 0,2232 mol Learners must not round this value, as it is not the final answer yet.

*final answer marks only awarded if mole ratio is shown

Question 10 – acids and bases

10.1 Bases that partially/ do not completely dissociate in water to give a low OH- concentration. ✓✓ **(2)**

10.2 $Cu(OH)_2$✓ + HNO_3✓ → $Cu(NO_3)_2$✓ + H_2O✓ ✓**bal**

10.3 Na_2CO_3 ✓ + H_2SO_4 ✓→ Na_2SO_4 ✓ + H_2O ✓ + CO_2✓ ✓**bal** **[10]**

Question 11- formulae ✓✓**each**

11.1 $FeCl_2$

11.2 $BaCO_3$

11.3 $(NH_4)_2S0_4$

11.4 $K_2Cr_2O_7$ **[2 x 4 = 8]**

Question 12- naming

✓✓**each**

12.1 calcium nitrate

12.2 aluminium hydroxide

12.3 copper (II) oxide **[2 x 4 =8]**