

HILLCREST HIGH SCHOOL



PHYSICAL SCIENCE EXAM MEMO

GRADE 10

TIME: 2 HRS

EXAMINER: MRS SMITH

JUNE 2022

TOTAL : 138

MODERATORS: MS BADENHORST
MRS KNOX-WHITEHEAD

SECTION A : CHEMISTRY 90

QUESTION 1:

(2 x 6 = 12)

- 1.1 A ✓ ✓
- 1.2 C
- 1.3 B
- 1.4 B
- 1.5 A
- 1.6 D

QUESTION 2

(8)

- 2.1 homogeneous ✓ (1)
- 2.2 distillation ✓ (1)
- 2.3 boiling point ✓ (1)
- 2.4.1 liquid to gas ✓ (1)
- 2.4.2 condensation ✓ (1)
- 2.5 A ✓ it has a boiling point higher than the heat supplied. ✓ (2)

QUESTION 3 **(6)**

3.1 - 20 °C ✓ (1)

3.2 X ✓
X is the gaseous phase ✓ where the molecules are furthest apart ✓. (3)

3.3 a phase change is occurring and the kinetic energy remains constant (2)

QUESTION 4 **(7)**

4.1 energy required to remove an electron from an atom in the gaseous phase. (1)

4.2 X Metals give up electrons more easily than non metals (2)

4.3 X (1)

4.4 As you move from left to right across a period the number of protons and electrons increases, thus the force of attraction between protons and electrons. Thus more energy is required to remove an electron. (3)

QUESTION 5 **(21)**

5.1.1 KMnO_4 (2)

5.1.2 SO_3 (2)

5.1.3 $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ (2)

5.2.1 iron (III) chloride (2)

5.2.2 carbon tetrachloride (2)

5.2.3 lithium sulphate (2)

5.3.1 $2 \text{HCl} + \text{Ca}(\text{OH})_2 \rightarrow \text{CaCl}_2 + 2 \text{H}_2\text{O}$ (2)

5.3.2 $\text{C}_{12}\text{H}_{22}\text{O}_{11} \rightarrow 12 \text{C} + 11 \text{H}_2\text{O}$ (2)

5.4 $4 \text{NH}_3 + 5 \text{O}_2 \rightarrow 4 \text{NO} + 6 \text{H}_2\text{O}$ (5)

QUESTION 6

(18)

6.1.1 alkaline earth metals ✓ (1)

6.1.2 aluminium, sodium, silicon, phosphorus, sulphur, chlorine ✓ (1)

6.1.3 $100 - (78,99 + 11,01) = 10$ (1)

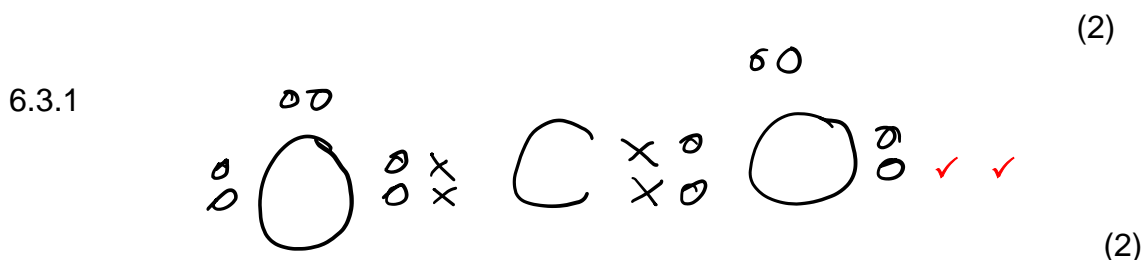
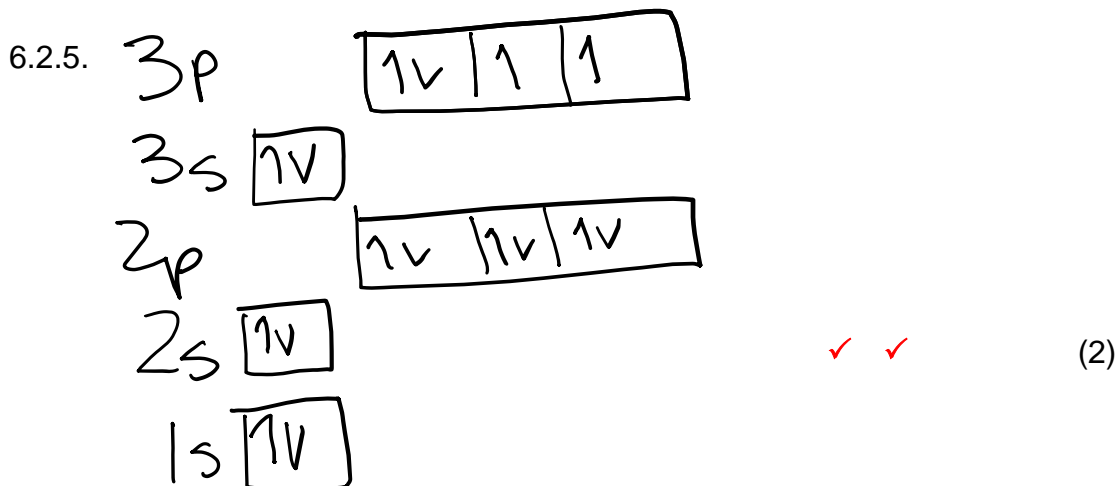
6.1.4 $RAM = \left(\frac{78,99}{100} \times 24\right) + \left(\frac{10}{100} \times 25\right) + \left(\frac{11,01}{100} \times 26\right)$ ✓ ✓ ✓m for /100
 $RAM = 18,9576 + 2,5 + 2,8626$

$RAM = 24,32 \text{ amu/u}$ ✓ (4)

6.2.1 Q ✓ and Y ✓ (2)

6.2.2 R ✓ and Y ✓ (cations are + ions – so you are looking for the 2 ions that become positive and thus lose electros to have the same electron configuration as Argon(S)) (2)

6.2.3 P ✓ and T ✓ (anions are - ions – so you are looking for the 2 ions that become negative and thus gain electros to have the same electron configuration as Argon(S)) (2)



6.3.2 polar covalent ✓ (1)

QUESTION 7

(6)

$$7.1 \quad \Delta H = H_{\text{products}} - H_{\text{reactants}} \quad \checkmark$$

$$\Delta H = 60 - 20 \quad \checkmark$$

$$\Delta H = 40 \text{ kJ.mol}^{-1} \quad \checkmark \quad (3)$$

$$7.2 \quad 160 - 60 \quad \checkmark = 100 \text{ kJ.mol}^{-1} \quad \checkmark \quad (2)$$

$$7.3 \quad \text{exothermic} \quad \checkmark \quad (1)$$

QUESTION 8 (12)

Calculate the

$$8.1 \quad m = n M \quad \checkmark$$

$$m = 4,5 \times 76 \quad \checkmark$$

$$m = 342 \text{ g} \quad \checkmark \quad (3)$$

$$8.2 \quad V = n V_o \quad \checkmark$$

$$V = 2,75 \times 22,4 \quad \checkmark$$

$$V = 61,6 \text{ dm}^3 \quad \checkmark \quad (3)$$

$$8.3 \quad n = \frac{m}{M} \quad \checkmark$$

$$n = \frac{88}{44} \quad \checkmark$$

$$n = 2 \text{ mol}$$

$$\text{No} = n N_A \quad \checkmark$$

$$N = 2 \times 6,02 \times 10^{23} \quad \checkmark$$

$$N = 1,204 \times 10^{24} \text{ molecules } C_3H_8$$

$$\text{No of H atoms} = N \times 8$$

$$= 1,204 \times 10^{24} \times 8 \quad \checkmark$$

$$= 9,632 \times 10^{24} \text{ atoms} \quad \checkmark \quad (6)$$

*just be careful here – the question only asked for the no. of hydrogen atoms (not the total atoms), which is 8 hydrogens in C₃H₈.

SUB TOTAL (90)

SECTION B : PHYSICS

(50)

QUESTION 9

(4 X 2 = 8)

- 9.1 A ✓ ✓
9.2 B
9.3 C
9.4 D
-

QUESTION 10

(12)

- 10.1 transverse. ✓ (1)
10.2 10cm ✓ (1)
10.3 $2\lambda \rightarrow 4\text{m}$
 $\lambda \rightarrow 2\text{m}$ ✓ ✓ (2)
10.4 B and D A and B (any two) ✓ ✓ (1)
10.5.1 $1\lambda \rightarrow 0,5\text{s}$

$$1\lambda \rightarrow 1\text{s}$$

*be careful here – 3 crests is actually only 2 full waves

10.5.2

$$f = \frac{1}{T}$$

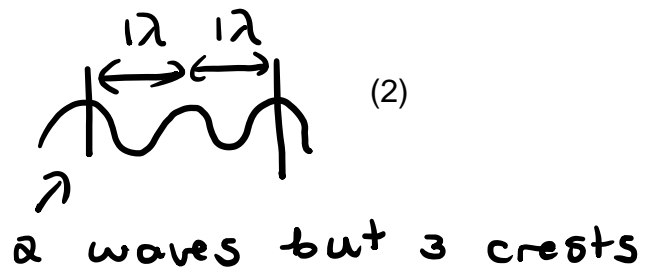
$$= \frac{1}{0,5} \quad \checkmark$$

$$= 2 \text{ Hz}$$

$$v = f \times \lambda \quad \checkmark$$

$$v = 2 \times 2 \quad \checkmark$$

$$v = 4 \text{ ms}^{-1} \quad \checkmark$$



QUESTION 11

(16)

11.1

$$d = s \times t \quad \text{or } \Delta x = v \cdot \Delta t \quad \checkmark$$

$$d = 1500 \times 0,018 \quad \checkmark$$

$$d = 27\text{m}$$

distance to the floor

$$27\text{m} / 2 \quad \checkmark$$

$$13,5 \text{ m} \quad \checkmark \quad (5)$$

$$11.2.1 \quad 20\,000 \text{ H} \quad \checkmark \quad z \quad (1)$$

$$11.2.2 \quad \lambda = v/f \quad \checkmark$$

$$\lambda = 1500 / 20\,000 \quad \checkmark$$

$$\lambda = 0,075 \text{ m} \quad \checkmark \quad (3)$$

$$11.3.1 \quad \text{same} \quad \checkmark \quad (2)$$

$$11.3.2 \quad \text{increase} \quad \checkmark \quad (2)$$

$$11.4 \quad \text{ultra sound} \quad \checkmark \quad (1)$$

$$11.5 \quad \text{not harmful to foetus or mother} \quad \checkmark \quad (2)$$

QUESTION 12 (6)

$$12.1.1 \quad \text{highest point on a wave} \quad \checkmark \quad (1)$$

$$12.1.2. \quad \text{The number of waves pulses per second.} \quad \checkmark \quad \checkmark \quad (2)$$

$$12.1.3 \quad \text{The maximum displacement of a particle from its equilibrium position} \quad \checkmark \quad \checkmark \quad (2)$$

$$12.2 \quad f = \frac{1}{T}$$

$$= \frac{1}{3} \quad \checkmark \quad (2)$$

$$= 0,33 \text{ Hz} \quad \checkmark$$

$$12.3 \quad v = f \times \lambda \quad \checkmark$$

$$v = 0,33 \times 5 \quad \checkmark$$

$$v = 1,65 \text{ m}\cdot\text{s}^{-1} \quad \checkmark \quad (3)$$

QUESTION 13**(8)**

13.1.1 microwaves ✓

(1)

13.1.2 longer ✓

(2)

13.2 $f = \frac{c}{\lambda}$ ✓

$$f = \frac{3 \times 10^8}{2 \times 10^{-2}}$$
 ✓

$$f = 1,5 \times 10^{10} \text{ Hz}$$

$$E = h \times f$$
 ✓

$$E = 6,63 \times 10^{-34} \times 1,5 \times 10^{10}$$
 ✓

$$E = 9,95 \times 10^{-24} \text{ J}$$
 ✓

Or

$$E = \frac{hc}{\lambda}$$
 ✓

$$= \frac{6,63 \times 10^{-34} (3 \times 10^8)}{2 \times 10^{-2}}$$
 ✓ ✓ ✓

$$= 9,95 \times 10^{-24} \text{ J}$$
 ✓

(5)

SUB TOTAL (50)
TOTAL (138)
