ALEXANDER ROAD HIGH SCHOOL

JUNE 2019 2 HOURS

PHYSICAL SCIENCE JUNE EXAM PAPER 2

JA TOTAL = 100

GRADE 10

1.1 D ✓✓
1.2 A ✓✓
1.3 D ✓✓
1.4 B ✓✓
1.5 C ✓✓
1.6 B ✓✓
1.7 A ✓✓
1.8 A ✓✓
1.9 C ✓✓
1.10 D ✓✓

[2x10=20]

QUESTION 2:

2.1 *A pure substance is any substance that has a constant composition ✓and cannot be separated into simpler components by physical methods. ✓*

2.2

2.2.1 *Melting / fusion. ✓*
2.2.2 *Boiling. ✓*

2.3 *Temperature is a measure of the average kinetic energy ✓of the particles of a substance whereas heat is energy in transit due to a difference in temperature. ✓*

2.4 *From D to E, the heat energy is used to break the intermolecular forces/bonds between the molecules ✓of substance X rather than increasing the average kinetic energy of the molecules.*

2.5 *The boiling point of a substance is the <u>temperature at which the vapour pressure equals the external (atmospheric) pressure</u>.* ✓✓

2.6 *220°C.* ✓

2.7 *Naphthalene.* ✓

2.8 *LOWER THAN.* ✓

- *The scientists obtained a <u>higher boiling point</u> than the SABS experimenters.* ✓
- *Therefore, the scientists performed their experiment with <u>greater external (atmospheric) pressure</u> than the SABS experimenters.* ✓
- *External (atmospheric) pressure is higher at lower altitudes.* ✓

[15]

<u>QUESTION 3:</u>

3.1.1 *Potassium / K.* ✓
3.1.2 *20.* ✓
3.1.3 *Zinc / Zn.* ✓
3.1.4 *65.* ✓
3.1.5 *16.* ✓
3.1.6 *18.* ✓

3.2.1 ✓*core electron shells with appropriate labels.*
✓*valence shell with appropriate labels.*

3.2.2 *2.* ✓
3.2.2 *Alkaline earth metals.* ✓

3.3.1 $F\ (9e^-)$: $1s^2 2s^2 2p^5$ ✓$1s^2$ ✓$2s^2 2p^5$.
3.3.2 *Neon / Ne.* ✓
3.3.3. *Halogens.* ✓

3.4.1 MgF_2 ✓✓
3.4.2 *Ionic bonding.* ✓
3.4.3 ✓*formation of* Mg^{2+} ✓*formation of* F^- ✓*formation of* MgF_2 *(using square brackets).*

[20]

QUESTION 4:

4.1 *Isotopes are <u>atoms of the same element</u> having the <u>same number of protons, but different numbers of neutrons</u>.* ✓✓

4.2 $^{63}_{29}Cu$ *– 29 protons and 34 neutrons.* ✓ $^{65}_{29}Cu$ *– 29 protons and 36 neutrons.* ✓

4.3 *Let* $^{63}_{29}Cu$ *have an abundance of* $x\%$*. Then the abundance of* $^{65}_{29}Cu$ *is* $(100 - x)\%$*.*

$$63{,}5 = \frac{x(63)\ \checkmark\ + (100 - x)(65)\ \checkmark}{100}$$

$\%\ ^{63}_{29}Cu = \ x = 75\%$ ✓ $\%\ ^{65}_{29}Cu = 100 - x = 25\%$ ✓

[8]

QUESTION 5:

5.1 *The first ionisation energy is the <u>energy needed (per mole) to remove the first electron</u> from an atom in the gaseous phase.* ✓

5.2 *LESS THAN.* ✓

- *Sodium atoms are <u>larger</u> than sulphur atoms.* ✓
- *Sodium's valence electron is <u>further from the nucleus than / not held as tightly as</u> sulphur's valence electrons.* ✓

[4]

QUESTION 6:

6.1 *A chemical bond is a <u>mutual attraction between two atoms</u>* ✓*resulting from the <u>simultaneous attraction between their nuclei and the outer electrons</u>.* ✓

6.2.1 *Metallic bonding.* ✓
6.2.2 *Covalent bonding.* ✓
6.2.3 *Ionic bonding.* ✓

6.3.1 *A covalent bond is a bond formed by the <u>overlapping of half-filled orbitals</u>* ✓✓*in non-metals resulting in the sharing of electrons.*
6.3.2 N_2 *– pure / non-polar* ✓ H_2O *– polar* ✓
6.3.3 ✓✓*(two N atoms with correct number of electrons around each).*
6.3.4 *Three / one triple bond.* ✓
6.3.5 ✓✓*(two H atoms singly-bonded to the O atom; shape NOT important).*

6.4.1 *Cu(s) is held together with <u>metallic bonds</u> whereas KCl(s) is held together with <u>ionic bonds</u>.* ✓
In a metallic bond there are <u>free delocalised valence electrons</u> ✓*whereas in an ionic bond the <u>electrons are held tightly by the negative ion / non-metal atom</u>.* ✓

6.4.2 *A malleable material is one which can be bent / twisted / hammered into shape whereas a brittle material cannot be.* ✓
Due to the free delocalised valence electrons throughout Cu(s) the metallic bond can break and reform elsewhere allowing for Cu atoms to be rearranged without the whole material breaking. ✓
Due to positive and negative ions in KCl(s) rearranging the atoms could result in two positives or two negatives lining up causing strong forces of electrostatic repulsion resulting in the whole material breaking. ✓

[20]

<u>QUESTION 7:</u>

7.1.1 FeO. ✓✓
7.1.2 $Mg(OH)_2$. ✓✓
7.1.3 K_2SO_4. ✓✓
7.1.4 Ag_2SO_3. ✓✓
7.1.5 NH_4NO_3. ✓✓

7.2.1 *Aluminium nitride.* ✓
7.2.2 $M_{AlN_3} = 1(27) + 3(14)$ ✓$= 69$. ✓ *(answer only: 2/2).*

[13]