**Chemistry**

**Standard level**

**Paper 1B**

Practice paper

**Topic: Models to Materials (SL)**

**1.** The Van Arkel-Ketelaar triangle (Section 17 of the IB Data Booklet) represents the continuum of bonding between metallic, ionic, and covalent extremes.

(a) Using Section 17, deduce the bonding character of $SiO_2$ (Silicon dioxide) and describe its expected physical appearance at room temperature. **[2]**

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(b) Explain why binary compounds with a large electronegativity difference are located at the 'Ionic' apex of the triangle. **[2]**

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(c) Identify the bonding type that would correspond to an average electronegativity of 1.0 and a difference of 0. **[1]**

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**2.** The table below compares the physical properties of pure Copper and the alloy Brass (Copper-Zinc).

| Material | Hardness (Units) | % Change in Lattice Size |
|---|---|---|
| Pure Copper | 40 | 0% |
| Brass | 120 | +5% |

(a) Describe how the structure of Brass differs from pure Copper at the atomic level. **[2]**

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(b) Explain why the hardness of the material increases when Zinc is added to Copper. **[3]**

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**3.** Addition polymers are synthesized from monomers containing carbon-carbon double bonds.

(a) Draw the repeat unit for Polypropene, given the monomer $CH_2=CHCH_3$. **[2]**

(b) Discuss two environmental impacts resulting from the use of non-biodegradable polymers. **[2]**

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