Name _____

SL Score

/48

Practice Exam: Paper 2
Topic 4: Bonding

SL

1. Explain why:

(i) calcium has a higher melting point than potassium.

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(2)

(ii) sodium oxide has a higher melting point than sulfur trioxide.

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(3)

2. Describe and compare **three** features of the structure and bonding in the three allotropes of carbon: diamond, graphite and C_{60} fullerene.

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(6)

3. Draw the Lewis structure of CO_2 and predict its shape and bond angle.

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(2)

4. Describe the structure and bonding in SiO_2.

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(2)

5. Explain why silicon dioxide is a solid and carbon dioxide is a gas at room temperature.

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(2)

6. Explain the electrical conductivity of molten sodium oxide.

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(2)

7. Ethene, C_2H_4, and hydrazine, N_2H_4, are hydrides of adjacent elements in the periodic table.

(a) (i) Draw Lewis (electron dot) structures for C_2H_4 and N_2H_4 showing all valence electrons.

(2)

(ii) State and explain the H–C–H bond angle in ethene and the H–N–H bond angle in hydrazine.

(4)

(cont.)

(b) The polarity of a molecule can be explained in terms of electronegativity.

(i) Define the term electronegativity.

(2)

(ii) Compare the relative polarities of the C–H bond in ethene and the N–H bond in hydrazine.

(1)

(iii) Hydrazine is a polar molecule and ethene is non-polar. Explain why ethene is non-polar.

(1)

8. (i) Draw the Lewis structures for carbon monoxide, CO, carbon dioxide, CO_2 and methanol, CH_3OH.

(3)

(ii) List, with an explanation, the three compounds in order of increasing carbon to oxygen bond length (shortest first).

(2)

9. Predict the shape and bond angles for the following species:

(i) CO_2

(2)

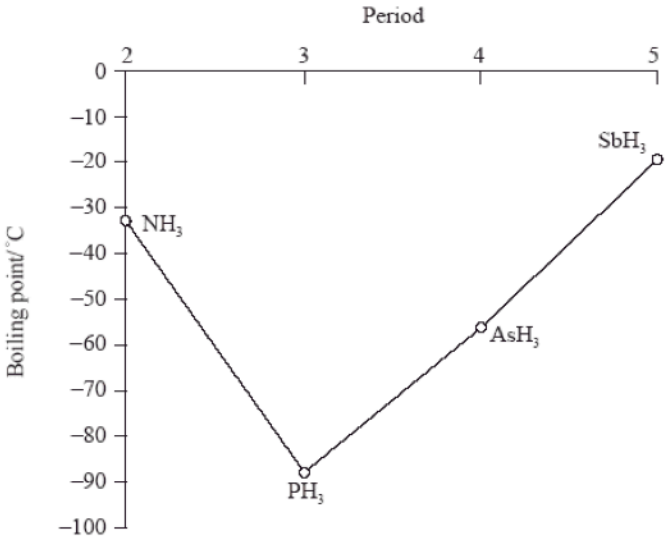
(ii) CO_3^{2-}

(2)

(iii) BF_4^-

(2)

10. The graph below shows the boiling points of the hydrides of group 5. Discuss the variation in the boiling points.



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(4)

11. Using Table 7 of the Data Booklet, predict and explain which of the bonds O-H, O-N or N-H would be most polar.

(2)

12. Predict and explain which of the following compounds consist of molecules:

NaCl, BF_3, $CaCl_2$, N_2O, P_4O_6, FeS and CBr_4.

(2)