Subject: Chemistry Year Group: Year 11 into Year 12

Name ………………………………………….

**A. Written task**

Using approximately 250 of your OWN words, outline the development of the modern Periodic Table, describing how it differs from earlier attempts to classify elements. You should include a bibliography listing at least two sources of reference, one of which MUST be a book. Remember to make your references detailed i.e. the chapters and pages consulted should be stated. It may be useful to include diagrams.

**B. Assessment of key bridging topics**

This section contains questions on the key bridging topics covered in the Transition Chemistry document. The Transition document contains information, links to supporting information (textbook, videos), example questions and practice questions. You should read and work through the transition document before you attempt these questions. We expect that this document will be handed in to your teacher at the beginning of year 12.

1. Fill in the missing gaps [6]

|  |  |  |  |
| --- | --- | --- | --- |
| **Isotope** | **Number of neutrons** | **Number of protons** | **Number of electrons** |
| 14C |  |  |  |
| 37Cl |  |  | 17 |
| 64Cu | 35 |  |  |
| 31P |  |  |  |
| 55Mn |  | 25 |  |
| 56Fe |  | 26 |  |

2. (a) What is an isotope? [2]

(b) A sample of rubidium was analysed and found to consist of two isotopes, Rb-85 and Rb-87. Information about these two isotopes is given in the table. Use this information to calculate the relative atomic mass of this sample of rubidium to **two decimal places**. [2]

|  |  |  |
| --- | --- | --- |
| **Isotope** | **mass** | **Abundance** |
| Rubidium-85 | 85.00 | 72.15% |
| Rubidium-85 | 87.00 | 27.85% |

(c) The two isotopes of rubidium have the same chemical reactivity and undergo the same chemical reactions. Suggest why. [1]

(d) A sample of zinc was found to contain four isotopes and their relative abundancies are given in the table. Calculate the relative atomic mass of this sample of zinc. [2]

|  |  |
| --- | --- |
| **Isotope** | **Abundance** |
| 64Zn | 49.0% |
| 65Zn | 27.85% |
| 66Zn | 4.3% |
| 67Zn | 18.8% |

3. Give the electron arrangements (e.g. 2,8,1) for the following elements? [5]

(i) Chlorine

(ii) Carbon

(iii) Potassium

(iv) Magnesium ion, Mg2+

(v) Oxide ion, O2-

4. Work out the relative formula mass for the following: [5]

(i) Na2CO3  (ii) CuO (iii) Ca3(PO4)2 (iv) LiOH (v) AlBr3

5. What is the mass of: [4]

(i) 4 moles of water (ii) 3 moles of silicon dioxide SiO2

(iii) 0.5 moles of sodium thiosulphate Na2S2O3

(iv) 0.25 moles of ammonium phosphate (NH4)3PO4

6. How many atoms are there in [2]

(i) One mole of helium He? (ii) One mole of hydrogen H2 ?

7. Magnesium reacts with hydrochloric acid as shown by the equation:

Mg(s) + 2HCl(aq) 🡺 MgCl2(aq) + H2(g)

Complete the missing gaps: [3]

The equation tells us that when 1 mole of magnesium reacts with \_\_\_\_\_\_ moles of hydrochloric acid, the reaction produces \_\_\_\_\_\_ mole of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and 1 mole of hydrogen.

(i) What mass of hydrogen is produced when 1 mole of magnesium reacts with excess acid? [1]

(ii) What mass of magnesium chloride is produced when 0.1 mole of magnesium reacts with excess acid? [2]

(iii) What mass of magnesium would produce 6g of hydrogen? [2]

8. Titanium metal can be prepared by displacing titanium from titanium chloride using magnesium. What mass of titanium could be made from 20g of titanium chloride? [3]

TiCl4 + 2Mg 🡺 Ti + 2MgCl2

9. (i) Lead oxide can be prepared from the ore galena (lead sulfide), by heating it with oxygen. How much lead oxide could be made from 120g of lead sulfide? [3]

2PbS + 3O2 🡺 2PbO + 2SO2

(ii) The lead oxide can be reduced with carbon to produce lead. Calculate how much lead could be made from 100g of lead oxide? [3]

2PbO + C 🡺 2Pb + CO2

10. Calcium carbonate (limestone) reacts with hydrochloric acid to produce calcium chloride, carbon dioxide and water. What mass of hydrochloric acid is required to react completely with 1.75g of calcium carbonate? [3]

CaCO3 + 2HCl 🡺 CaCO3 + CO2 + H2O

11. Draw dot-and-cross diagrams of the following substances:

a. CaF2 [2]

b. CO2 [2]

12. State the formulae of the following compounds: [6]

a. Magnesium chloride b. Potassium sulfate

c. Lithium oxide d. Methane

e. Aluminium bromide f. Silicon dioxide

13. Name the following substances: [6]

a. K2SO4 b. H2SO4

c. KNO3 d. CaCO3

e. ZnCl2 f. HBr

14. Balance the following equations:

a. N2  + H2 → NH3 [1]

b. C6H14  + O2  → CO2 + H2O [1]

c. Fe(NO3)2 + Na3PO4 → Fe3(PO4)2  + NaNO3 [1]

d. H2O2 🡺 H2O + O2 [1]

15. Write the following numbers in standard form:

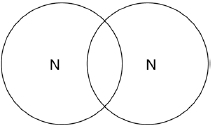
a. 76,320 b. 6,055 c. 0.00435 [3]

16. Give the following values in the stated number of significant figures (s.f.):

a. 25.682 (4 s.f.) b. 74,983 (3 s.f.) c. 0.0296 (2 s.f.) [3]

17.This question is about structure and bonding. [2]

(a)     Complete the dot and cross diagram to show the covalent bonding in a nitrogen molecule, N2.  Show only the electrons in the outer shell.



(b)     Explain why nitrogen is a gas at room temperature. [3]

Answer in terms of nitrogen’s structure.

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(c)     Graphite is soft and is a good conductor of electricity. [4]

Explain why graphite has these properties.

Answer in terms of structure and bonding.

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18.This question is about some compounds made from iodine. [4]

(a)  Magnesium iodide can be made by reacting magnesium with iodine.

Describe, in terms of electrons, what happens when magnesium reacts with iodine.

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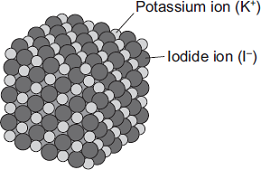
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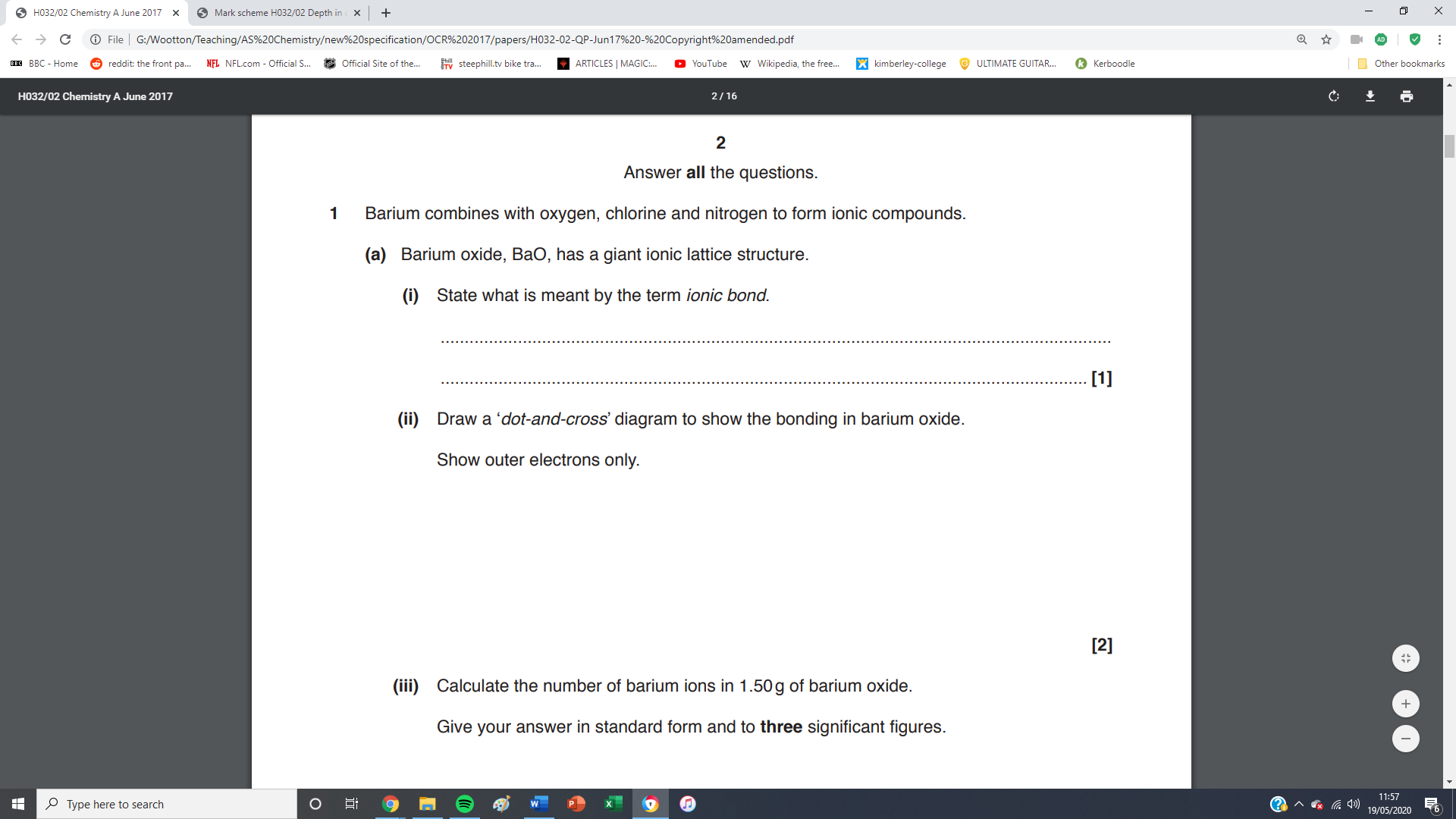
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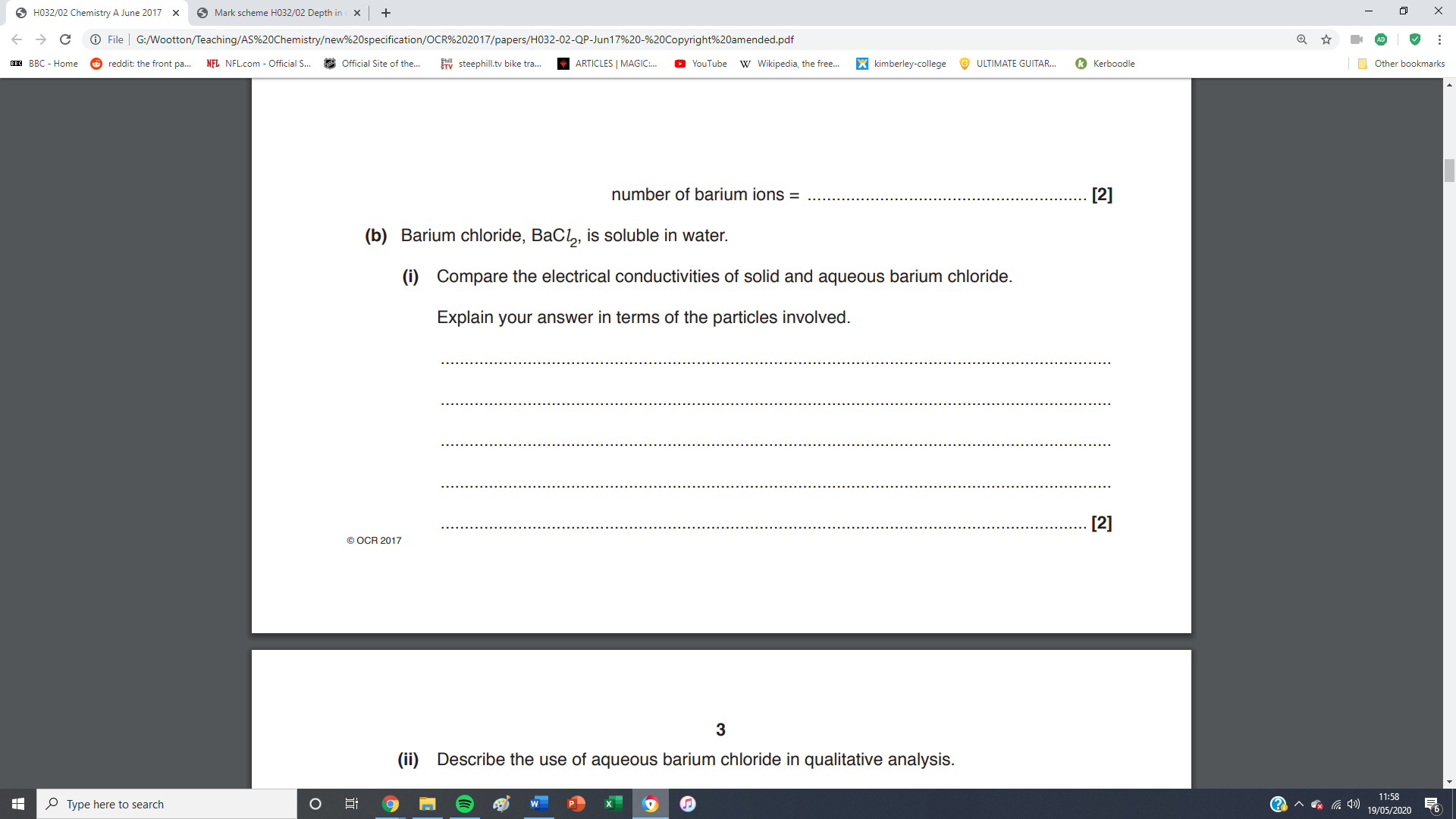
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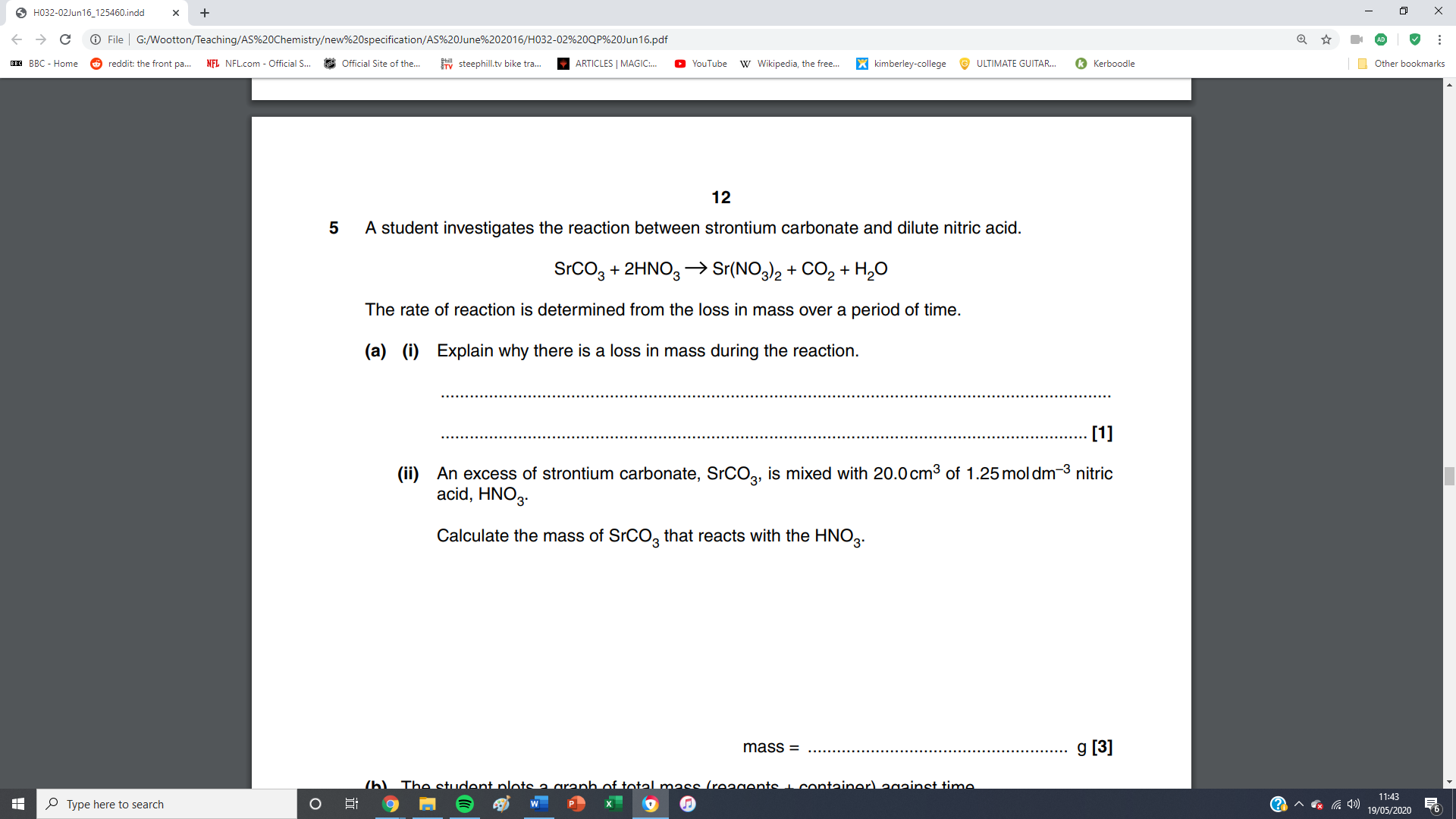
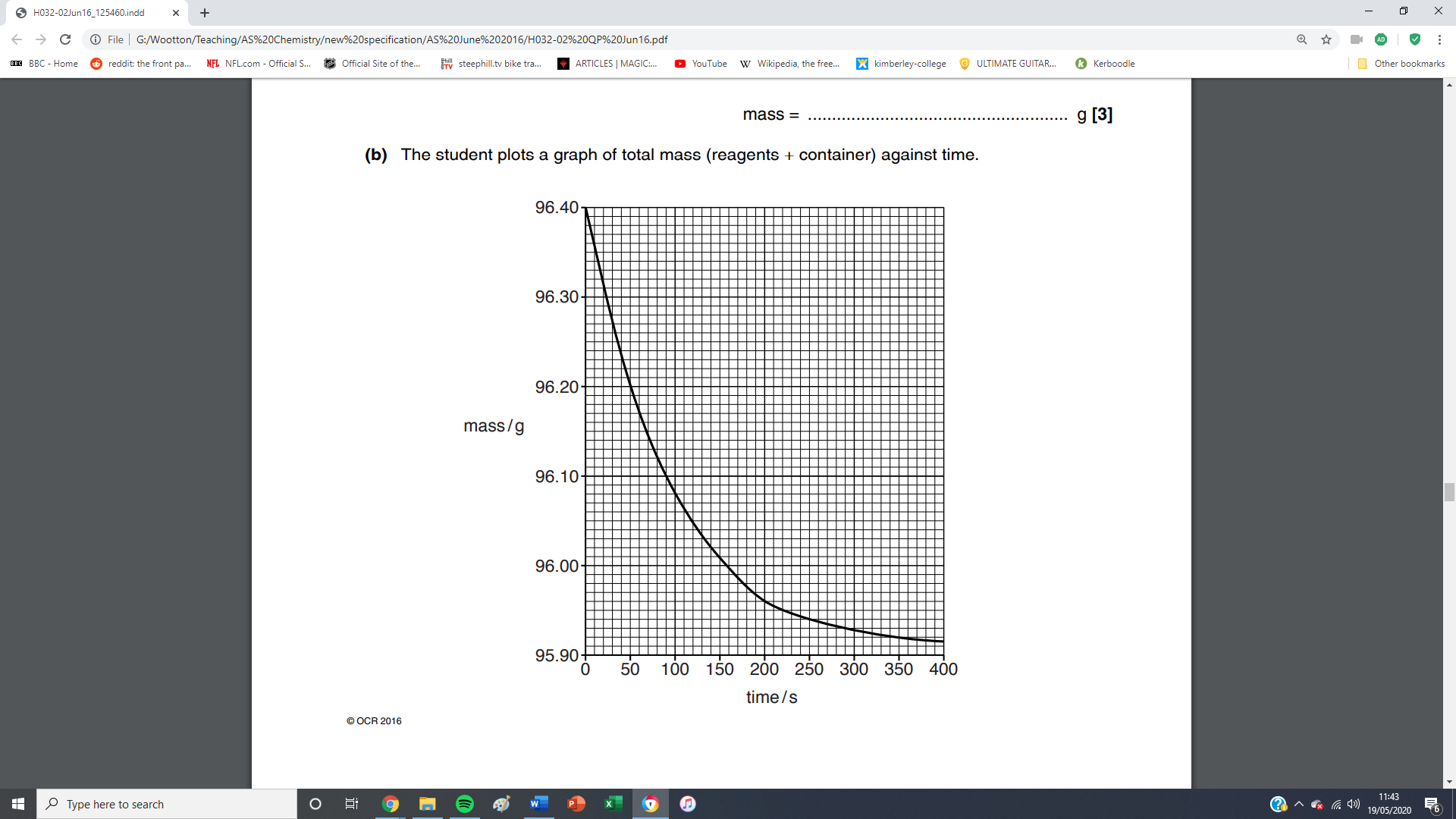
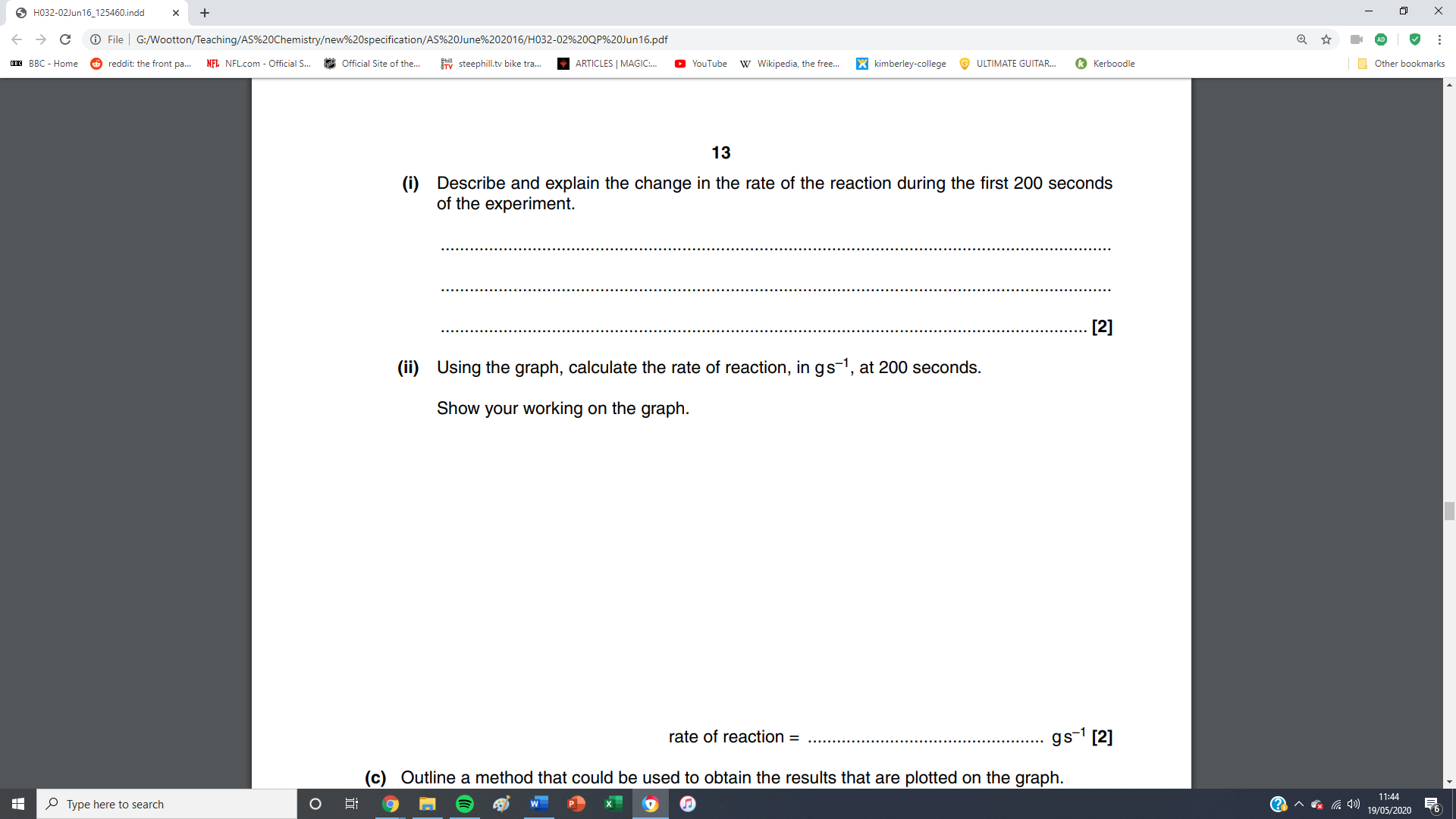
(b)     The diagram shows the structure of potassium iodide. [3]

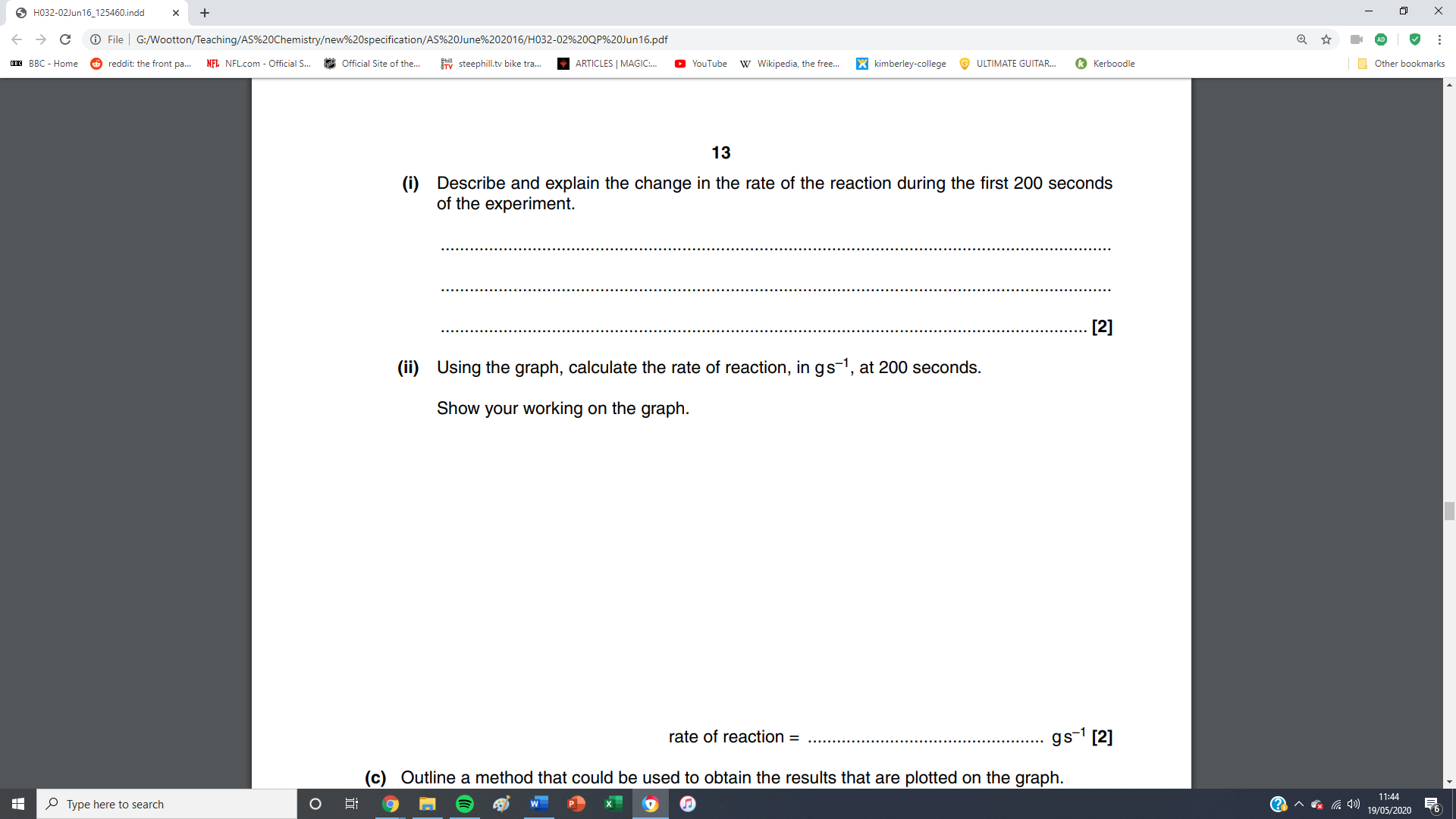


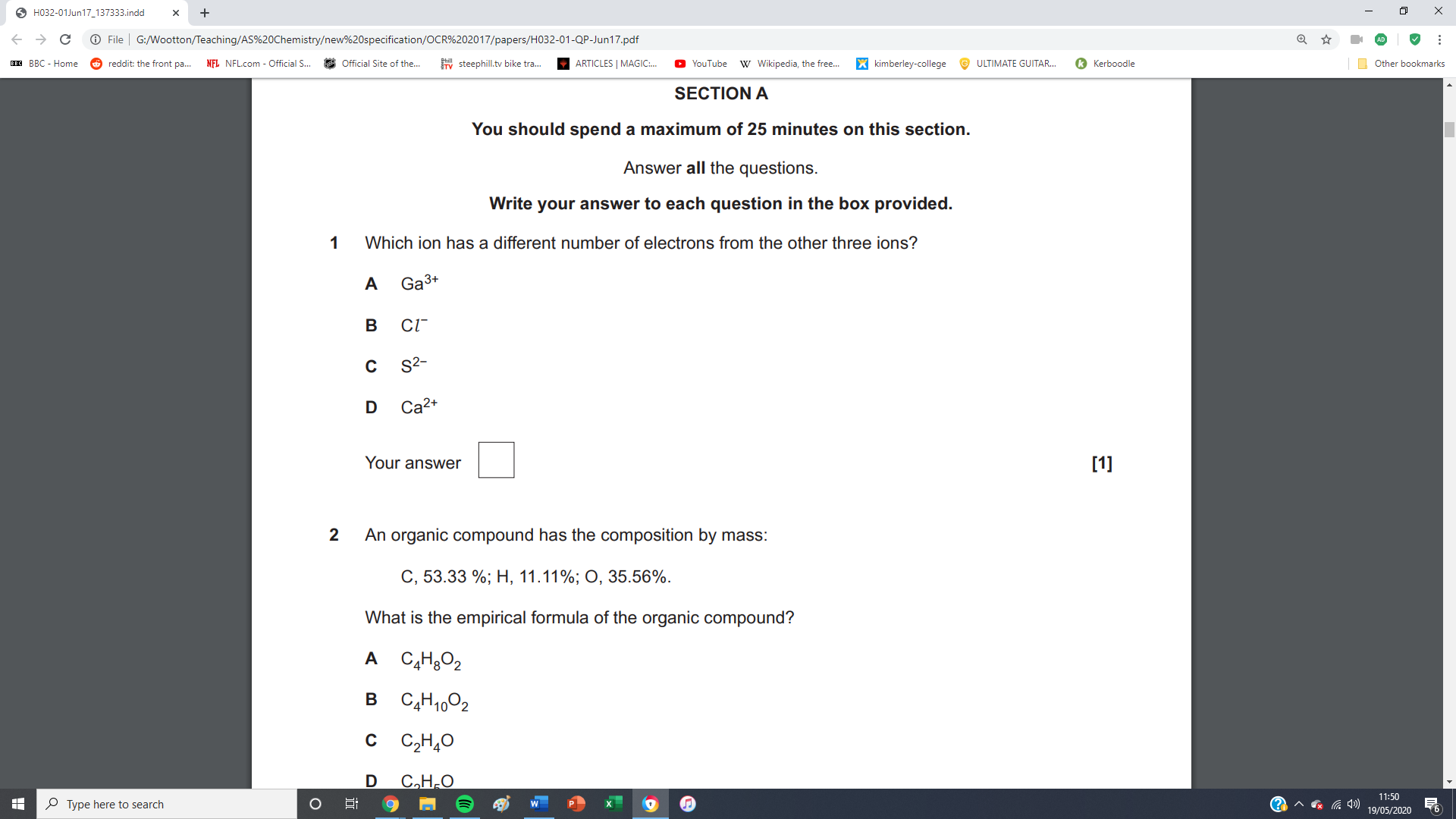
Explain why a high temperature is needed to melt potassium iodide.

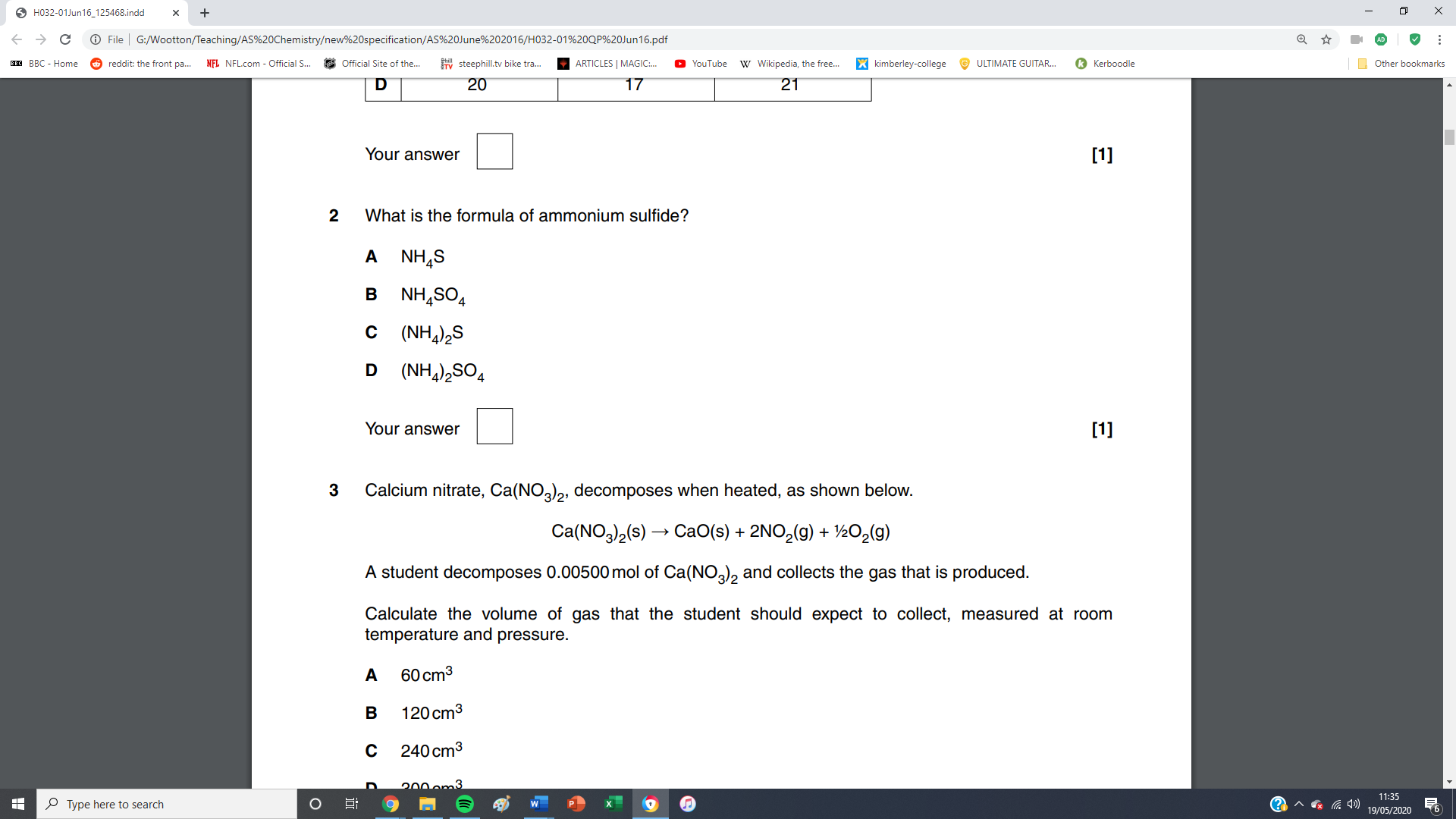
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