**3.** (a) (i) Define the term **standard enthalpy of formation**, *H*f.

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(3)

(ii) The following table shows some values of standard enthalpy of formation.

|  |  |  |
| --- | --- | --- |
| Name | Formula | *H*f/kJ mol–1 |
| ethene | C2H4(g) | +52.3 |
| hydrogen bromide | HBr(g) | –36.2 |
| bromoethane | C2H5Br(g) | –60.4 |

Use the data in the table above to calculate the standard enthalpy change for the following reaction.

C2H4(g) + HBr(g)  C2H5Br(g)

(2)

(iii) State the significance of the sign of the value obtained in part (a)(ii) above.

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(1)

(b) Enthalpy changes can also be calculated usingaverage bond enthalpy data.

|  |  |
| --- | --- |
| Bond | Average bond enthalpy/kJ mol–1 |
| C == C | +612 |
| C  C | +348 |
| C  H | +412 |
| C  Br | +276 |
| H Br | +366 |

Use the data in the table above to recalculate the enthalpy change for the reaction in part (a)(ii).

C2H4(g)  HBr(g)  C2H5Br(g)

(3)

(c) Suggest why the value obtained in part (b) above is likely to be less accurate than that obtained in part (a)(ii).

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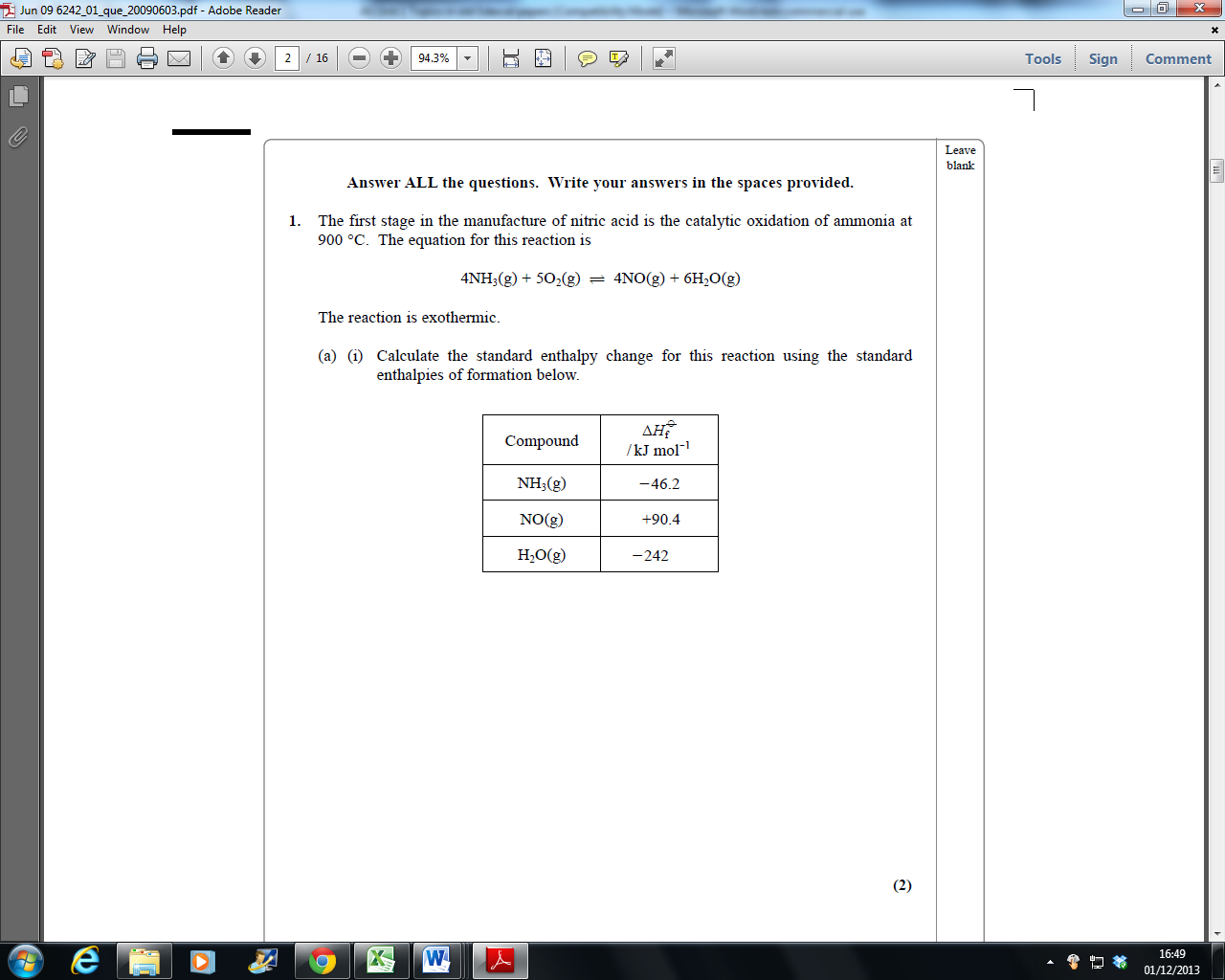
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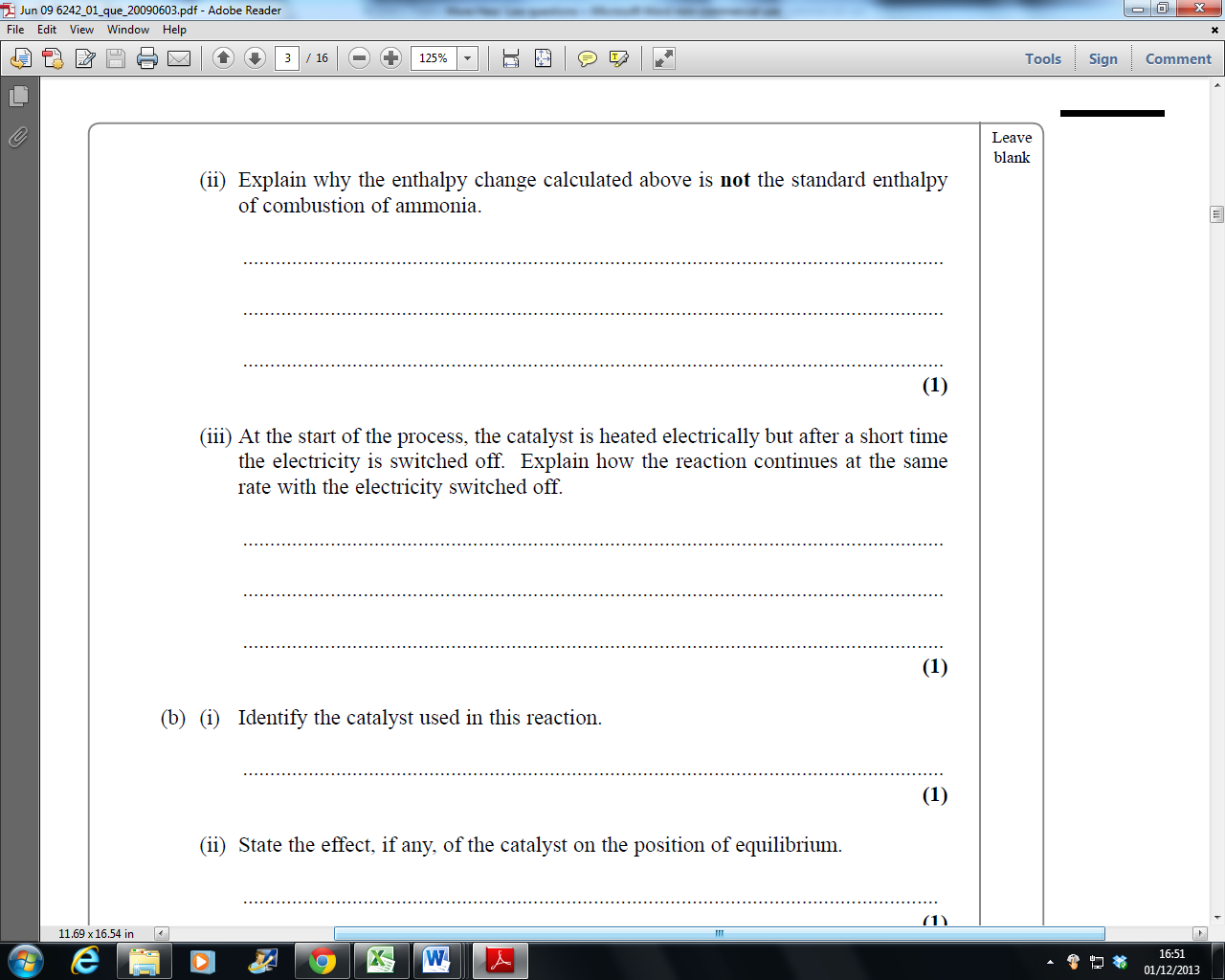
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(2)

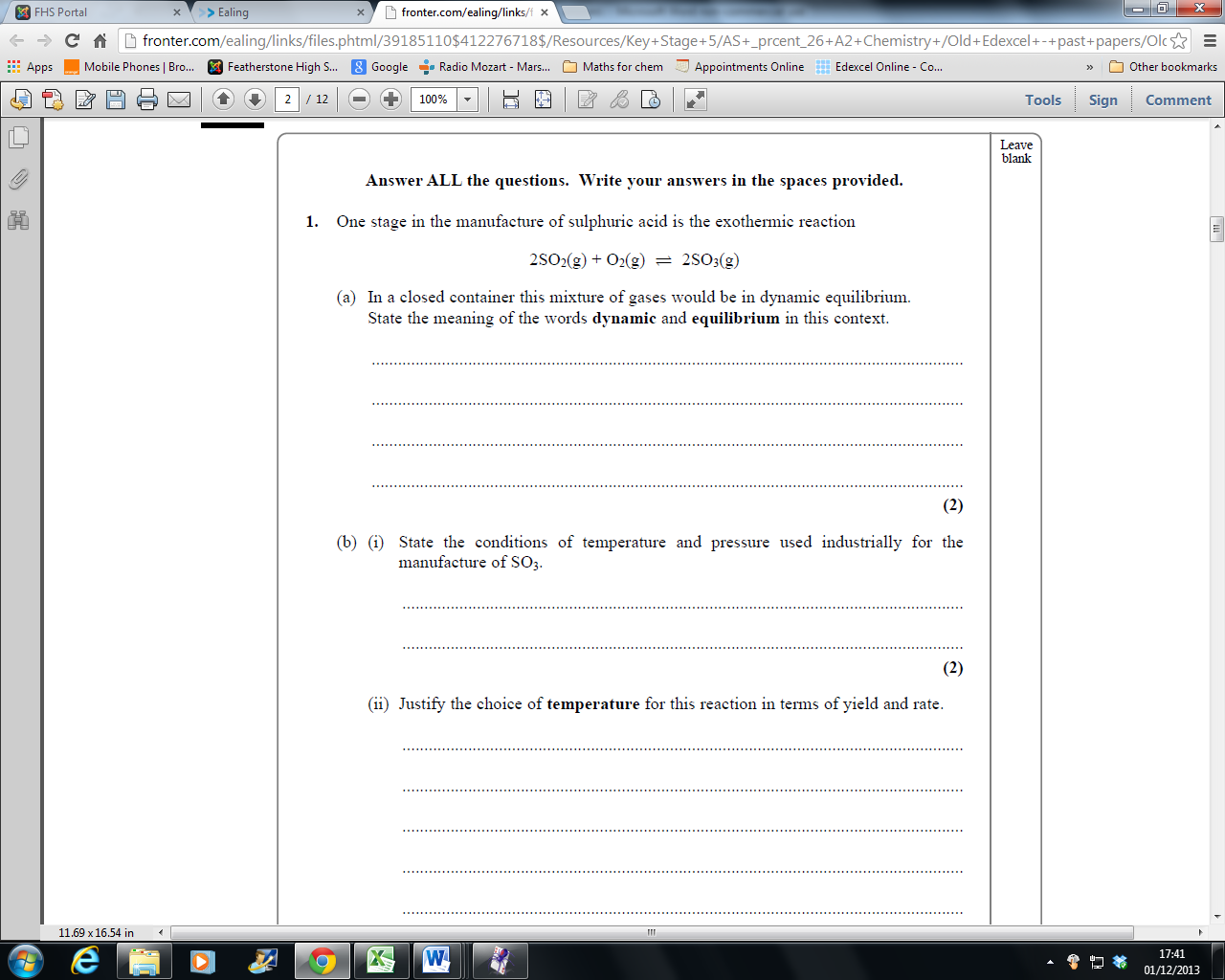
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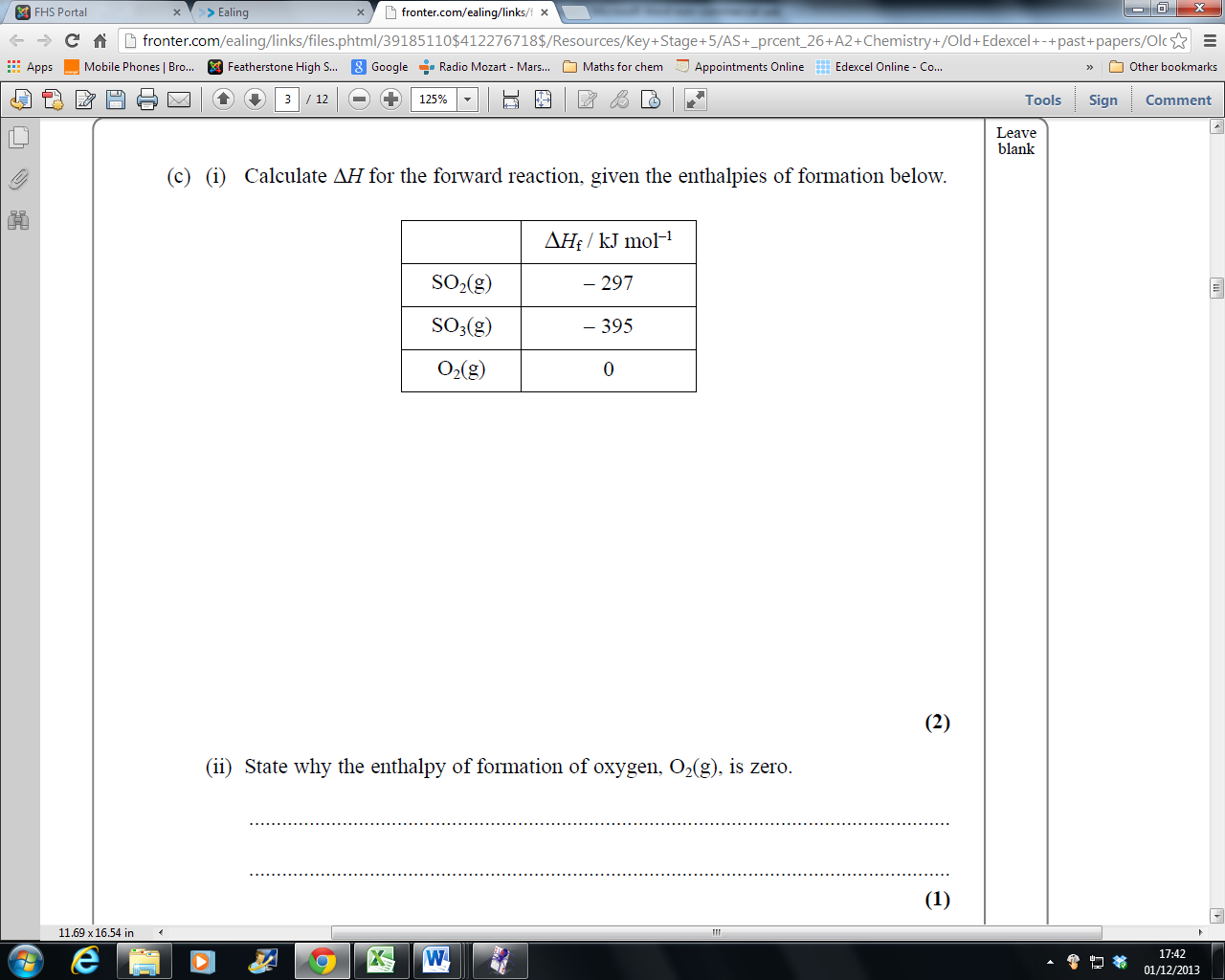
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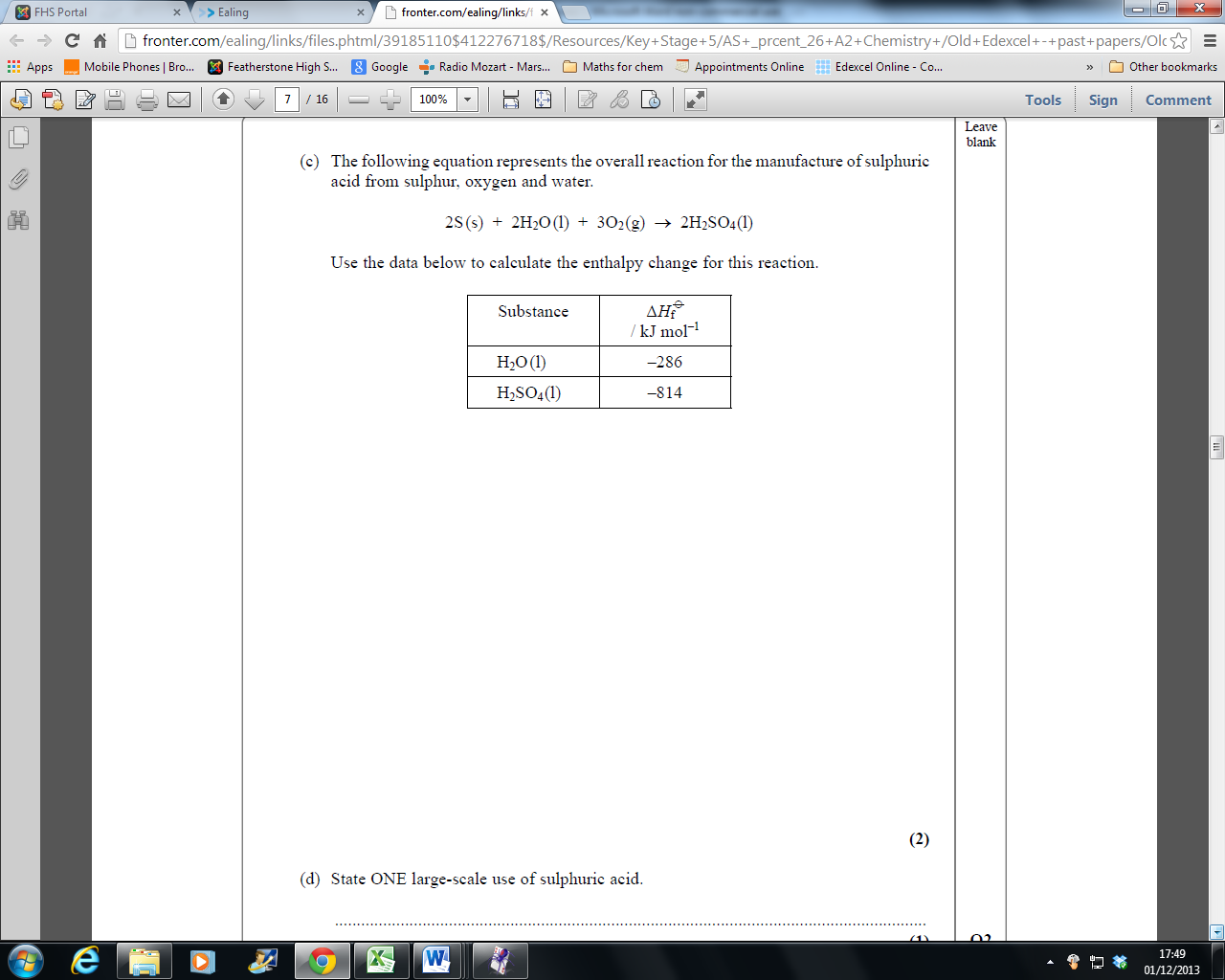
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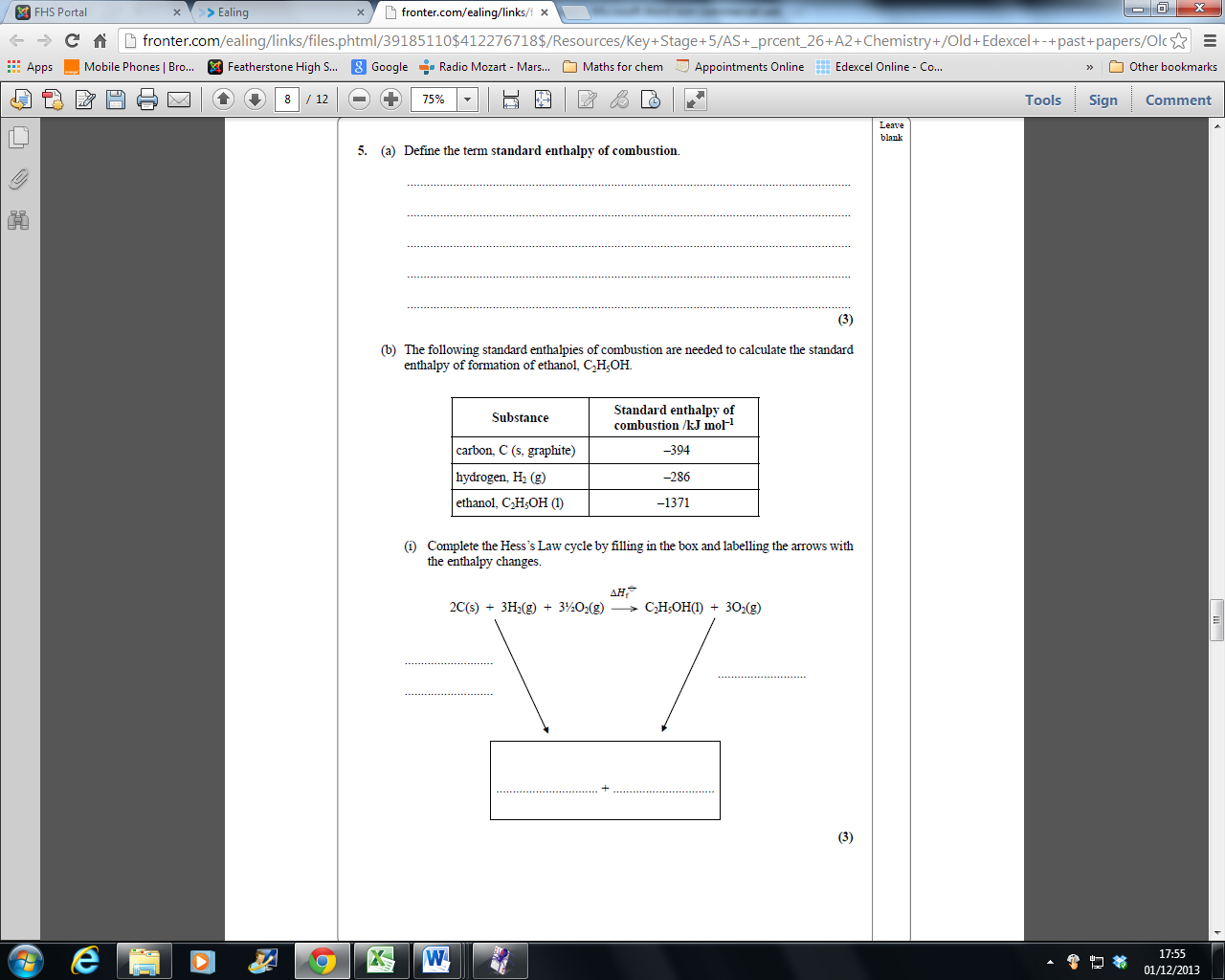


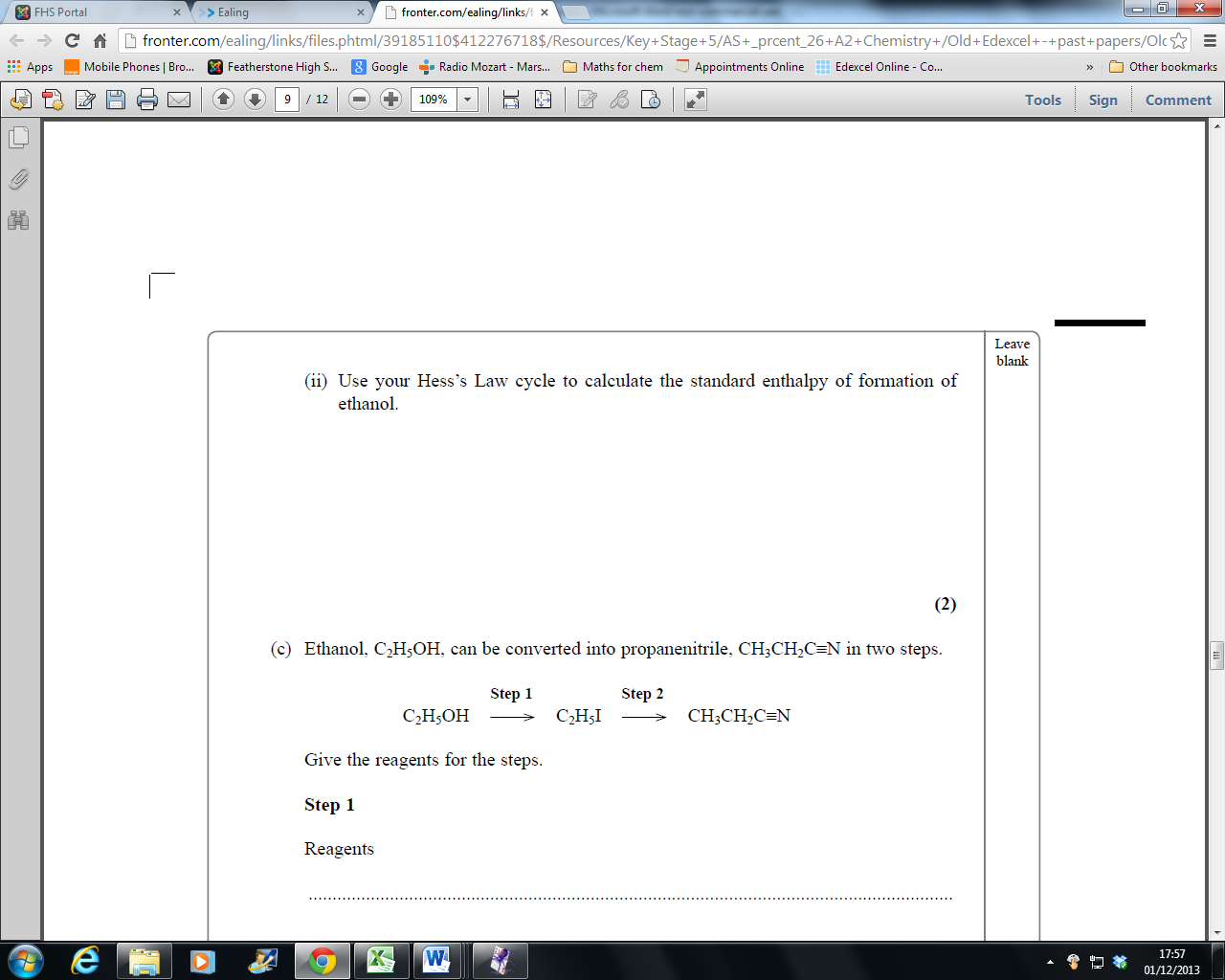
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