iG Chem 6 EQ P3 15w to 01s 4Teachers NEW 26marks

PAPERS 1, 3 and 6
Percentage of all WEIGHTED marks awarded for each topic from w2001 to w2015 (green) and % of Paper 3 marks (red)

<table>
<thead>
<tr>
<th>% Marks</th>
<th>Paper 3 %</th>
</tr>
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<tbody>
<tr>
<td>7.8</td>
<td>3.3</td>
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<tr>
<td>8.2</td>
<td>13.2</td>
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<td>4.4</td>
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<td>5.6</td>
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<tr>
<td>12.7</td>
<td>10.8</td>
</tr>
<tr>
<td>21.1</td>
<td>10.5</td>
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<tr>
<td>3.5</td>
<td>3.6</td>
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<tr>
<td>8.6</td>
<td>11.2</td>
</tr>
<tr>
<td>7.3</td>
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<tr>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>12.4</td>
<td>20.2</td>
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</table>

ALL PAPERS Topic Number

PAPER 3
Percentage of all marks awarded for each topic from w2001 to w2015 (red cross) and for 2013s to 2015w (green triangle)

<table>
<thead>
<tr>
<th>% Marks awarded for each topic</th>
<th>1</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
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<td>13.7</td>
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<td>0.6</td>
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<td>12.9</td>
<td>7.9</td>
<td>5.2</td>
<td>12.7</td>
<td>11.4</td>
<td>3.5</td>
<td>3.1</td>
<td>20.4</td>
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<tr>
<td>P3 ALL</td>
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<td>1.1</td>
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<td>10.5</td>
<td>3.6</td>
<td>11.2</td>
<td>9.6</td>
<td>3.3</td>
<td>1.0</td>
<td>20.2</td>
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</table>

Paper 3 Topic Number

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<tr>
<td>232</td>
<td>74</td>
<td>312</td>
<td>155</td>
<td>81</td>
<td>26</td>
<td>256</td>
<td>246</td>
<td>85</td>
<td>296</td>
<td>231</td>
<td>76</td>
<td>24</td>
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<td>233</td>
<td>6</td>
<td>3.2</td>
<td>13.1</td>
<td>4.6</td>
<td>3.5</td>
<td>1.1</td>
<td>11.0</td>
<td>10.5</td>
<td>3.6</td>
<td>12.7</td>
<td>9.9</td>
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<td>59</td>
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<td>38</td>
<td>6</td>
<td>47</td>
<td>54</td>
<td>19</td>
<td>58</td>
<td>48</td>
<td>14</td>
<td>5</td>
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<td>Average marks per Q</td>
<td>3.9</td>
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</table>
CIE iGCSE Chemistry Syllabus Details
(syllabus code 0620)
The core material is examined in all three exam papers (papers 1, 3 and 6) and is intended to assess understanding up to a grade C level. From 2016, the Supplement material is examined in all three papers, however, before 2016 papers 1 and 6 did not contain any Supplement material. If the number of marks that can be awarded above a C grade will remain the same, in practice this means that:
1. Paper 3 will contain fewer Supplement marks, so more core marks so will be easier (if you can answer the Paper 3 questions from before 2016 then you will be fine)
2. Papers 1 and 3 will contain Supplement marks, unlike in all papers before 2016, so will assess material they have not done before, so will be harder because of the questions and as there are no previous questions to practice on, will be harder because of the newness.

Material that is new or changed in 2016 is highlighted with BLACK LINES next to it.

Q# 1/ iGCSE Chemistry/2013/w/Paper 31/ Q7

(b) Bond forming is exothermic, bond breaking is endothermic. Explain the difference between an exothermic reaction and an endothermic reaction.
(c) Use the bond energies to show that the following reaction is exothermic.
Bond energy is the amount of energy (kJ/mol) which must be supplied to break one mole of the bond.

\[
\begin{align*}
\text{H} & \quad \text{+} \quad \text{Cl} - \text{Cl} \quad \rightarrow \quad \text{H} - \text{C} - \text{Cl} \quad + \quad \text{H} - \text{Cl}
\end{align*}
\]

Bond energies in kJ/mol

\[
\begin{array}{ll}
\text{Cl-Cl} & +242 \\
\text{C-Cl} & +338 \\
\text{C-H} & +412 \\
\text{H-Cl} & +431
\end{array}
\]

<table>
<thead>
<tr>
<th>bonds broken</th>
<th>energy in kJ/mol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>bonds formed</th>
<th>energy in kJ/mol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>total energy =</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>total energy =</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

\[
\text{[4]}
\]
7 Hydrogen reacts with the halogens to form hydrogen halides.

(a) Bond energy is the amount of energy, in kJ, that must be supplied (endothermic) to break one mole of a bond.

<table>
<thead>
<tr>
<th>bond</th>
<th>bond energy in kJ/mol</th>
</tr>
</thead>
<tbody>
<tr>
<td>H–H</td>
<td>+436</td>
</tr>
<tr>
<td>Cl–Cl</td>
<td>+242</td>
</tr>
<tr>
<td>H–Cl</td>
<td>+431</td>
</tr>
</tbody>
</table>

Use the above data to show that the following reaction is exothermic.

\[ \text{H–H} + \text{Cl–Cl} \rightarrow 2\text{H–Cl} \]

Q# 3/ iGCSE Chemistry/2006/s/Paper 3/

6 (a) Exothermic reactions produce heat energy.

An important fuel is methane, natural gas. The equation for its combustion is as follows.

\[ \text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O} \]

(i) In chemical reactions bonds are broken and new bonds are formed. Using this reaction give an example of

a bond that is broken, .................................................................................................................... [2]

a bond that is formed. .................................................................................................................... [2]

(ii) Explain, using the idea of bonds forming and breaking, why this reaction is exothermic, that is it produces heat energy.

.................................................................................................................................................... [2]

(b) Some radioactive isotopes are used as nuclear fuels.

(i) Give the symbol and the nucleon number of an isotope that is used as a nuclear fuel.

.................................................................................................................................................... [2]
Q# 4/ iGCSE Chemistry/2005/w/Paper 3/ Q7

7 In 1909, Haber discovered that nitrogen and hydrogen would react to form ammonia. The yield of ammonia was 8%.

\[ \text{N}_2 (g) + 3\text{H}_2 (g) \rightleftharpoons 2\text{NH}_3 (g) \]

the forward reaction is exothermic

catalyst: platinum

temperature: 600 °C

pressure: 200 atm

(c) (i) Complete the following table that describes the bond breaking and forming in the reaction between nitrogen and hydrogen to form ammonia.

<table>
<thead>
<tr>
<th>bonds</th>
<th>energy change /kJ</th>
<th>exothermic or endothermic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 mole of N \equiv N</td>
<td>+945</td>
<td></td>
</tr>
<tr>
<td>broken</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 moles of N broken</td>
<td>+1308</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 moles of N – H formed</td>
<td>-2328</td>
<td></td>
</tr>
</tbody>
</table>

(ii) Explain, using the above data, why the forward reaction is exothermic.

[3]

Q# 5/ iGCSE Chemistry/2004/s/Paper 3/

1 It was reported from America that a turbine engine, the size of a button, might replace batteries. The engine would be built from silicon which has suitable properties for this purpose.

(a) (i) Why are batteries a convenient source of energy?

......................................................................................................................... [1]

(ii) The engine will run on a small pack of jet fuel. What other chemical is needed to burn this fuel?

......................................................................................................................... [1]
Q# 6/ iGCSE Chemistry/2003/s/Paper 3/Q5

(i) The reactions of these metals with oxygen are exothermic.

\[ 2\text{Ba}(s) + \text{O}_2(g) \rightarrow 2\text{BaO}(s) \]

(i) Give an example of bond forming in this reaction.

(ii) Explain using the idea of bond breaking and forming why this reaction is exothermic.

Mark Scheme

Q# 1/ iGCSE Chemistry/2013/w/Paper 31/ Q7

(b) exothermic reaction gives out energy [1]
endothermic reaction absorbs [1]
takes in energy [1]

(c) bonds broken energy
C-H +412
Cl-Cl +242
total energy +654 [1]

bonds formed energy
C-Cl −338
H-Cl −431
total energy −769 [1]
energy change −115 [1]
negative sign indicates exothermic [1]

Q# 2/ iGCSE Chemistry/2009/s/Paper 31/

7 (a) (total endothermic change = 436 + 242 = +)678 kJ [1]
(total exothermic change = 2 \times 431 = −)862 kJ [1]
accept correct sign/supplied/absorbed for endo etc. [1]
accept correct sign/evolved/absorbed for exo etc. [1]
change for reaction = −184 kJ [1]

not necessary to calculate −184, just show that exo change > than endo etc.
e.g. allowed provided negative
−184 kJ scores all 3 marks [1]
Q# 3/ iGCSE Chemistry/2006/s/Paper 3/

6  (a)  (i)  Any bond that is broken C-H or O=O 
     Bond that is formed C=O or O-H 
     Do not insist on double bonds 

(ii)  More energy is released forming bonds 
      than is used breaking bonds 
      For just - more energy released than used [1] 
      For - energy is released forming bonds and it is used 
      breaking bonds [1] 

(b)  (i)  U
     235

Q# 4/ iGCSE Chemistry/2005/w/Paper 3/ Q7

(c) (i)  H—H
      endothermic 
      endothermic 
      exothermic 

(ii)  More heat given out than taken in [1] 
      $-2326 + 945 + 1308 = -75$kJ [1] 

OR More heat given out bond forming than taken in bond breaking [2] 
Must mention bond breaking and forming [2]

Q# 5/ iGCSE Chemistry/2004/s/Paper 3/

1.  (a)  (i)  portable [1]

(ii)  oxygen or air [1]

Q# 6/ iGCSE Chemistry/2003/s/Paper 3/Q5

(f)  (i)  barium - oxygen or ionic 

(ii)  bond forming energy released/exothermic 
     bond breaking energy taken in/endothermic 
     more energy released [1]