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**Question Answer Marks AO Element Notes Guidance**

1 endothermic **1**

2 heat given out / heat evolved **1**

3(a) 4 (NO) **1**

3(b) heat released / heat given out **1**

3(c) oxygen added (to NO) **1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 3(d) |  | acidic oxide**AND**nitrogen is a non-metal |  | **1** |

4(a) 4728 **1**

4(b) 6004 **1**

4(c) −1276 **1 ecf (a)** − **(b)**

5(a) Br2 on left (1)

**2**

2 (HBr) (1)

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|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 5(b) |  | the energy of the reactants ismore than the energy of theproducts / energy of the productsis less than the energy of thereactants / the reactants loseenergy when they formproducts |  | **1** |
|  | 6 |  | energy (level) of the products isgreater than the energy of thereactants **ORA** |  | **1** |

7(a) 2 (Na2S2O3) (1)

**2**

2 (NaI) (1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 7(b) |  | the energy of the reactants ismore than the energy of theproducts / the energy of theproducts is less than the energyof the reactants / the reactantslose energy when they formproducts |  | **1** |
|  | 8(a) |  | chromium(III) oxide losesoxygen / it losesoxygen / oxidation number ofchromium decreases |  | **1** |
|  | 8(b) |  | energy of reactants greater thanenergy of products **ORA** |  | **1** |

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9 absorbs heat / takes in heat **1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 10 |  | endothermic **AND**heating / absorbs heat |  | **1** |

11(a) oxygen / O2

**1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 11(b) |  | carbon + oxygen→ carbon dioxide |  | **1** |
|  | 11(c) |  | reactants on the left and producton the right (both required) |  | **1** |
|  | 12 |  | energy level of reactants aboveenergy level of products / thearrow is goingdownwards / energy (level) goesdown / product has less energythan reactants |  | **1** |

13 One mark each for any **2** of: **2**

• distance of flame from can

• length of wick

• same can

• volume of water (used) / massof water (used)

• same amount of stirring of thewater

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14 releases heat / heat given out **1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 15(a) |  | correct structure of ethaneshowing all of the atoms and allof the bonds |  | **1** |

15(b) 3 (H2)

**1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 15(c) |  | takes in heat (fromsurroundings)/absorbsheat / absorbs thermal energy |  | **1** |
|  | 16 2H2 + O2 → 2H2O**1** |  | **allow** multiples orfractions |

17(a) (zinc oxide) loses oxygen **1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 17(b) |  | reactant level below productlevel / reactants have lessenergy than products **ORA** |  | **1** |
|  | 18 |  | the energy of the reactants isgreater than the energy of theproducts / the product has lessenergy than the reactants / thearrow is going down (fromreactants to product) |  | **1** |

19 **1**

C - The reaction is endothermic.

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|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 20 |  | C - calcium carbonatedecomposing when heated |  | **1** |

21 B **1**

22 B **1**

23 **Q 1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 24 |  | make sure temperature changeis the same throughout / makesure that there are no hot spots/ no local heating |  | **1** |
|  | 25 |  | any two from:- same amount of solid / samemass of solid- same volume of water- same amount of stirring |  | **2** |

26 **1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 27 |  | exothermic and heat released /heat given out |  | **1** |

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28 temperature rises **1**

29 B **1**

30 exothermic **1**

31(a) thermometer **1**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | 31(b) |  | Any **two** from:• same volume of water in can |  | **2** |  | • **allow**: sametemperature of waterat start |
|  | • same height of burner (fromcan)• wick same height |  | • **allow**: same amountof fuels burnt / sametemperature rise |
|  | • same rate / amount of stirringof water |  | • **allow**: same type ofcan |
|  | 31(c) |  | so same temperature throughoutthe water / to stop differences intemperature in the different partsof the water / otherwise thetemperature will be higher at thebottom (of the water) / so nothotter in one place |  | **1** |  | **ignore**: to mix thewater / so there are noconvection currents |

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31(d) decreases / goes down **2 allow**: gases formed

|  |  |  |  |
| --- | --- | --- | --- |
|  | idea of liquid or fuel turning tovapour / gas |  | **ignore**: fuelsevaporate |

**note**: 2nd mark dependent on first

31(e) F **1**

32 A **1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 33(a) |  | substance / material / compound/ element / mixture (burnt) toproduce / release energy **or** heat |  | **1** |

33(b) Any **two** from: **2**

coal coke peat

petroleum / crude oilrefinery gas / LPGgasoline / petrolnaptha

kerosene / paraffindiesel (oil) / gas oilfuel oil propane butane

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|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 33(c) |  | wood / charcoal / animal dung /biomass / Uranium / U /plutonium / Pu |  | **1** |

34 **1**

C - The beaker feels warmer.

[Total: 60]