Answers to Option C test yourself questions

1 **a** 70%; **b** 18%

2 40%

3 **a** 22.7 kJ g^{-1}; **b** 48.3 kJ g^{-1}; **c** 33.2 kJ g^{-1}

4 **a** 35.9 kJ dm^{-3}; **b** 52.5 kJ dm^{-3}; **c** 39 600 kJ dm^{-3}; **d** 23 400 kJ dm^{-3}

5 **a** M; **b** P; **c** Q

6 **a** $C_{13}H_{28} \rightarrow C_8H_{18} + C_5H_{10}$
b $C_{10}H_{22} \rightarrow C_6H_{14} + C_4H_8$
c $C_{16}H_{34} \rightarrow C_9H_{18} + C_7H_{16}$

7 **a** *Ethanol*: 1.910 g of CO_2 released per gram of ethanol burned
0.064 39 g of CO_2 released per kJ of energy released
b *Hexane*: 3.063 g of CO_2 released per gram of hexane burned
0.063 43 g of CO_2 released per kJ of energy released

8 **a** 43.3 kg CO_2e; **b** 248 kg CO_2e

9 **a** $^{235}_{92}U + {}^{1}_{0}n \rightarrow {}^{236}_{92}U \rightarrow {}^{140}_{55}Cs + {}^{93}_{37}Rb + 3{}^{1}_{0}n$
b $^{235}_{92}U + {}^{1}_{0}n \rightarrow {}^{236}_{92}U \rightarrow {}^{105}_{42}Mo + {}^{129}_{50}Sn + 2{}^{1}_{0}n$

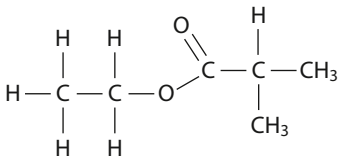
10 **a** $^{121}_{48}Cd$; **b** $^{96}_{40}Zr$

11 **a** 25 mg; **b** 6.25 mg; **c** 0.0980 mg

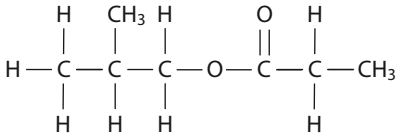
12 **a** 45 days; **b** 7×10^{11} y

13 **a** 800 y; **b** 168 d

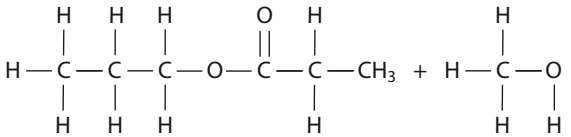
14 **a**



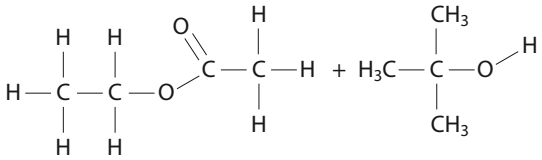
b



15 **a**



b



16 HCN, HF, CO, CO_2, H_2S, $CFCl_3$, N_2O

17 Three of: carbon dioxide; methane; nitrous oxide [nitrogen(I) oxide]; chlorofluorocarbons

18 **a** false; **b** false; **c** true; **d** true

19 **a** $PbSO_4(s) + 2e^- \rightarrow Pb(s) + SO_4^{2-}(aq)$
b $Ni(OH)_2(s) + OH^-(aq) \rightarrow NiO(OH)(s) + H_2O(l) + e^-$

20 $6C + Li_xCoO_2 \rightarrow Li_xC_6 + CoO_2$

21 **a** –0.17 V; **b** 0.68 V; **c** 0.81 V; **d** 1.82 V; **e** –0.77 V

22 **a** 1.17 V; **b** 1.32 V; **c** 1.35 V

23 **a** 0.39 V; **b** 1.07 V; **c** 0.58 V

24 **a** 0.06 V; **b** 0.03 V; **c** 0.04 V; **d** 0.09 V

25 **a** mass defect 0.069 511 u
binding energy 1.04×10^{-11} J
binding energy per nucleon 6.48 MeV
b mass defect 0.200 28 u
binding energy 2.99×10^{-11} J
binding energy per nucleon 8.12 MeV
c mass defect 0.528 45 u
binding energy 7.90×10^{-11} J
binding energy per nucleon 8.80 MeV
d mass defect 1.9398 u
binding energy 2.90×10^{-10} J
binding energy per nucleon 7.57 MeV

26 **a** 3.89×10^8 kJ mol^{-1}; **b** 1.70×10^9 kJ mol^{-1}

27 **a** 1.68×10^{10} kJ mol^{-1}; **b** 1.84×10^{10} kJ mol^{-1}

28 **a** 0.012 min^{-1}; **b** 8.04×10^{-3} d^{-1}; **c** 3.30×10^{-16} y^{-1}

29 **a** 134 minutes (135 minutes if all figures are carried through on the calculator); **b** 200 days; **c** 4.9×10^{15} years

30 **a** 29.8%; **b** 16.4%

31 Half-life = 1.33×10^6 s or 15.4 days
Mass left = 0.301 μg

32 **a** helium effuses at 4.00 times the rate of sulfur dioxide
b ethene effuses at 1.25 times the rate of propane
c hydrogen effuses at 2.82 times the rate of methane

33 **a** $32.1\,g\,mol^{-1}$; **b** $26.0\,g\,mol^{-1}$; **c** $27.0\,g\,mol^{-1}$

34 **a** 3.85×10^{-3} mol methane and 2.69×10^{-3} mol helium

b 4.14×10^{-3} mol carbon monoxide and 4.31×10^{-3} mol carbon dioxide

c 3.56×10^{-3} mol fluorine and 3.94×10^{-3} mol chlorine

35 (shortest wavelength) II < V < IV < I < III < VI

36 **a** p-type; **b** p-type; **c** n-type; **d** n-type