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Answers

Practice exam questions

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Check your answers to the questions in this issue.

Going green with enzymes (pp. 2–5)

1

a primary alcohol

b secondary alcohol

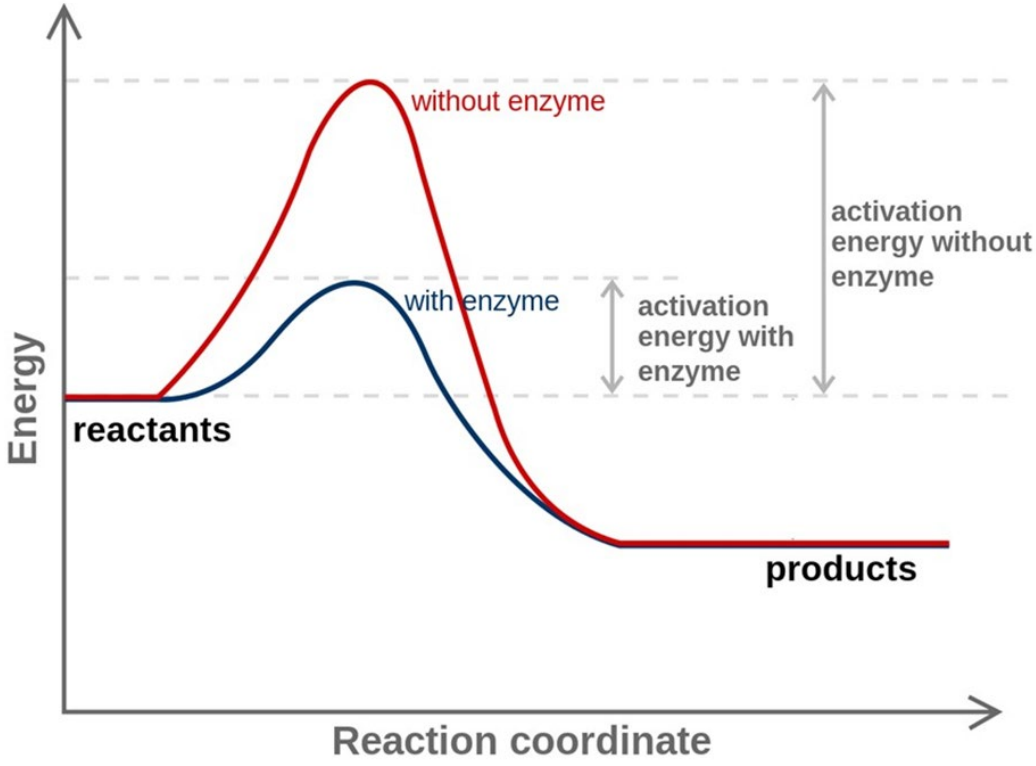
c thiol

d carboxyl (carboxylic acid)

e amino (primary amine)

f phenol

2



Stable and unstable compounds (pp. 24–27)

1 **a** **i** $XeF_2 = +2$

ii $XeF_4 = +4$

iii $XeF_6 = +6$

iv $XeO_3 = +6$

b **i** $NH_3 = -3$

ii $NF_3 = +3$

2 The oxidation states of the elements do not change, so the reaction does not involve redox. Xenon remains +6, fluorine –1, oxygen –2 and hydrogen +1.

3 Do an electron count. An arsenic atom has 5 outer-shell electrons. 6 chlorines supply 6 electrons. Add one for the negative charge, totalling 12 electrons. That means 6 electron pairs — these will be arranged octahedrally around arsenic, so the answer is an octahedron.

4 Calculate the energy needed to break the N_2 and $3H_2$ molecules into their constituent atoms.

ΔH = + 945 + 3(436) = +2253 kJ mol^{-1} (bond breaking, so endothermic).

Now calculate the energy released when assembling the 2N and 6H atoms into two molecules of ammonia:

ΔH = 6(–391) = –2346 kJ mol^{-1} (bond making, so exothermic).

Overall, for the reaction as shown in the equation:

ΔH = + 2253 – 2346 = –93 kJ mol^{-1}

This forms two moles of ammonia, so enthalpy of formation of NH_3 is:

ΔH_f (NH_3) = –93 ÷ 2 = –46.5 kJ mol-1