1. Atomic structure and the periodic table

Starter Quiz ·

AQA · GCSE · Chemistry

Name: _____ Score: _____

1. At constant temperature, increasing solution concentration primarily changes which feature?
   - ☐ Frequency of reactant collisions
   - ☐ The activation energy of the original pathway
   - ☐ Every particle's energy by the same factor
2. After a disturbance, which statement describes a new equilibrium?
   - ☐ The forward and reverse rates become equal again
   - ☐ Only the favoured direction keeps reacting
   - ☐ All original concentrations must be restored exactly
3. Why does a higher-boiling component generally condense lower in the column?
   - ☐ The lower region is hotter and it condenses before reaching cooler regions
   - ☐ Its molecules change into different compounds there
   - ☐ Every fraction is a pure substance
4. What is retained when bromine adds to an alkene?
   - ☐ Its carbon skeleton and original hydrogen atoms
   - ☐ Its carbon–carbon double bond unchanged
   - ☐ No bromine atoms in the product
5. What forms from ethanoic acid and ethanol in the taught reaction?
   - ☐ Ethyl ethanoate and water
   - ☐ Only carbon dioxide
   - ☐ An alkane and hydrogen
6. A double-stranded DNA model has 24 paired positions. Count all its nucleotides.

   _____ nucleotides
7. A supplied record has eight clear positives out of ten trials. Calculate positive percentage.

   _____ %
8. Six of eight supplied white-precipitate samples dissolve in excess sodium hydroxide. Calculate their percentage.

   _____ %

9. A supplied linear zero-background calibration has signal 20 at 2 mg/L and 40 at 4 mg/L. Read concentration for signal 35.

   _____ mg/L

10. Disposable energy is 15 units per task; reusable energy is 40 initially plus 5 per task. At which first whole task does reuse use strictly less energy?

   _____ tasks

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1. **Frequency of reactant collisions**

   Higher concentration packs more reactant particles into the same volume, so collisions happen more often - frequency is what changes. The activation energy and the particles' energy distribution are untouched at constant temperature.

2. **The forward and reverse rates become equal again**

   After a disturbance the system shifts until the forward and reverse rates match again - that equality defines the new equilibrium. The favoured direction does not run alone, and the new concentrations generally differ from the originals.

3. **The lower region is hotter and it condenses before reaching cooler regions**

   The column is hottest at the bottom. A high-boiling component condenses as soon as the vapour cools below its boiling point - which happens low in the column - while low-boiling vapours rise to cooler regions before condensing.

4. **Its carbon skeleton and original hydrogen atoms**

   Addition keeps the whole alkene skeleton: one bromine joins each double-bonded carbon and the C=C becomes C-C, with every original hydrogen untouched. The product is a dibromoalkane, so the double bond is NOT retained.

5. **Ethyl ethanoate and water**

   Acid plus alcohol gives an ester plus water: ethanoic acid and ethanol form ethyl ethanoate and water. No carbon dioxide, alkane or hydrogen is involved.

6. **48 nucleotides**

   The result is 48 nucleotides. Known: 24 paired positions, each holding one nucleotide from each of the two chains. Total nucleotides = 24 x 2 = 48 nucleotides.

7. **80 %**

   The result is 80 %. Known: 8 clear positives out of 10 trials. Use percentage = positives / trials x 100. Percentage = 8/10 x 100 = 80%. The proportion describes outcomes, not hydrogen purity.

8. **75 %**

   The result is 75 %. Known: 6 of 8 white-precipitate samples dissolve in excess sodium hydroxide. Use percentage = dissolving / total x 100. Percentage = 6/8 x 100 = 75%. This is a sample count, not a composition figure for any sample.

9. **3.5 mg/L**

   The result is 3.5 mg/L. Known: signal 20 at 2 mg/L and 40 at 4 mg/L, linear through zero. Signal per concentration = 10 per mg/L. At signal 35: concentration = 35/10 = 3.5 mg/L. The calibration line turns the signal into a concentration.

10. **5 tasks**

$15n = 40 + 5n$ gives $10n = 40$, so equality is $n = 4$. Strictly less reusable energy starts at task 5: 65 units versus 75 units. Do not report equality at 4 as a strict saving.