

Solutions

2.1

: acid deposition involves atmospheric reactions of sulfur dioxide/nitrogen oxides forming acidic compounds.; the greenhouse mechanism concerns absorption/emission of thermal infrared by gases such as carbon dioxide; do not treat them as identical.

2.2

: $m = C \times V$.; $m_{\text{remaining}} = 3.0 \text{ mg/L} \times 10.0 \text{ L} = 30 \text{ mg}$.

2.3

: removed mass equals initial minus remaining and percentage reduction equals change divided by initial $\times 100\%$.; $120 - 30 = 90 \text{ mg}$ retained under the stated assumptions.; $(12.0 - 3.0)/12.0 \times 100\% = 75\%$.

2.4

: final 3.0 mg/L exceeds the supplied maximum 2.0 mg/L .; percentage reduction and absolute target are different criteria.; 90 mg remains on the filter under the assumptions, requiring appropriate authorised handling rather than being ignored.

3.1

each: substance remains in liquid; removed substance is assumed retained on filter, not destroyed; other substances/qualities are unmeasured; the task target is fictional rather than an environmental standard; different atmospheric mechanisms need appropriate separate evidence/responses; further treatment/energy/waste effects and approved disposal need assessment before claiming complete success.

3.2

Local analytic rubric, 8 $\times$: state final 3.0 mg/L ; give 30 mg remaining; give 90 mg retained; give 75% reduction; say 2.0 mg/L target is unmet; distinguish removal from destruction; avoid purity/universal-success claim; require appropriate authorised waste assessment; coherent truthful 80–110 word response. Example: “The supplied treatment lowers the model substance concentration from 12.0 to 3.0 milligrams per litre, a seventy-five-percent reduction. At the assumed unchanged volume of ten litres, thirty milligrams remain in the liquid and ninety milligrams are retained on the filter. The final concentration still exceeds the fictional two-milligram-per-litre target. Removal from the liquid is therefore neither complete removal nor demonstrated destruction. Other substances and environmental effects were not measured, so purity and universal success cannot be claimed. The next assessment should consider further treatment, energy use and authorised handling of the filter waste before any real application.”