

Grade 9 Cumulative Competition Packet

Fictional paper models only. No real laboratory procedure or product claim is requested. Show units, evidence, and limits. Total: 20 points.

1. A sealed card reports mass 12.50 g then 12.49 g, uncertainty ± 0.02 g, while bubbles appear. Separate two observations from one inference and state what mass claim is supported. [4 pts]

2. A material has density 2.70 g/mL. A 13.5 g piece is mixed with 10.0 mL water without reaction. Predict its volume and explain what a particle model can and cannot show about the mixture. [4 pts]

3. A sample has 17 protons, 18 electrons, and 18 neutrons. Identify isotope/ion notation, then use periodic placement to predict one cautious chemical-property comparison. [4 pts]

4. A gas has 2.00 L at 300 K and 1.00 atm; at 450 K pressure is unchanged. Calculate volume, then state one variable that must be controlled before a rate comparison across gases. [4 pts]

5. Extended CER: A fictional separation recovers 80% of a salt mixture while another recovers 65%. Make bounded claim, cite comparison, explain conservation/particle reasoning, name limitation, and next measurement. [4 pts]
