Gas-Law Reasoning

Student Worksheet | g09_u09_w34

I can: use Boyle's, Charles's, and combined gas-law models with units and absolute temperature. **Safeguards:** convert °C to K before ratios; keep pressure/volume units consistent; models assume stated variables and an approximately fixed amount of gas. Data only; sources in `sources.md`.

1. State Boyle's-law variable relationship when T,n are constant.

2. State Charles's-law relationship when P,n are constant.

3. Convert 25.0°C to K.

4. Convert 100.0°C to K.

5. A gas changes 2.00 L to 1.00 L at constant T. Predict pressure factor.

6. Use $P_1V_1 = P_2V_2$: 1.20 atm, 2.50 L to 1.50 L. Find P_2.

7. 760 torr, 500 mL to 250 mL at constant T. Find P_2 in torr.

8. Explain why 0°C cannot be used as zero K.

9. At constant P, 300 K gas has 2.00 L. Find V at 450 K.

10. At constant P, 27°C gas has 1.50 L. Find V at 127°C.

11. A student uses 20/10 for a Charles ratio in Celsius. Critique.

12. Combined law: 1.00 atm, 2.00 L, 300 K to 1.50 atm, 450 K. Find V_2.

13. Combined law: 750 torr, 1.20 L, 20°C to 600 torr, 80°C. Find V_2.

14. Identify which law fits: P changes with V while T,n fixed.

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15. Identify which law fits: V changes with T while P,n fixed.

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16. Data card: P and V inverse-looking, but container leaks. State why Boyle model is limited.

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17. Data card: a flexible balloon warms and expands in open air. State a reasonable model and one uncertain variable.

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18. A calculation has P in atm and P in kPa. What unit action is required?

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19. Explain why a correct formula substitution can still give a weak conclusion.

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20. Write a cautious conclusion for data showing V rose from 1.00 to 1.20 L as T rose 300 to 360 K at near-constant P.
