1. A 1.28 mol sample of Ar gas is confined in a 31.5 liter container at 26.5 C.

If 1.28 mol of He gas is added holding the volume and temperature constant, the average kinetic energy of the total system will:

1. decrease
2. remain the same
3. increase
4. not enough information to answer the question

2. In the situation above, the pressure will **increase** because:

1. As the number of molecule-wall collisions increases, the force per collision increases.
2. **With more molecules per unit volume, the molecules hit the walls of the container more often.**
3. With more molecules in the container, the molecules have higher average speeds.
4. With higher average speeds, on average the molecules hit the walls of the container with more force.
5. None of the Above

3. A 0.900 mol sample of H2 gas is confined in a 22.4 liter container at 29.8 C.
If 0.900 mol of N\textsubscript{2} is substituted for the 0.900 mol of H\textsubscript{2}, holding the volume and temperature constant, the average kinetic energy will:

1. increase
2. decrease
3. remain the same
4. not enough information to answer the question

4. A 1.96 mol sample of CO\textsubscript{2} gas is confined in a 49.1 liter container at 32.3 °C. If the temperature of the gas sample is increased to 55.0 °C, holding the volume constant, the pressure will increase because:

Choose all that apply.
1. With higher average speeds, on average the molecules hit the walls of the container with more force.
2. With lower average speeds, the molecules hit the walls of the container less often.
3. As the average speed increases, the number of molecule-wall collisions decreases.
4. None of the Above

5. Mixing Na\textsubscript{2}CO\textsubscript{3} + CuCl\textsubscript{2} yields the following net ionic equation:

1. Na\textsubscript{2}CO\textsubscript{3} (s) + CuCl\textsubscript{2} (s) \rightleftharpoons CuCO\textsubscript{3} (s) +
2NaCl (s)
2. Na\(^+\) (aq) + CO\(_3^{2-}\) (aq) + Cu\(^{2+}\) (aq) + Cl\(^-\) (aq)
   \[\rightleftharpoons\] CuCO\(_3\) (s) + Na\(^+\) (aq) + Cl\(^-\) (aq)
3. 2Na\(^+\) (aq) + CO\(_3^{2-}\) (aq) + Cu\(^{2+}\) (aq) + 2Cl\(^-\) (aq)
   \[\rightleftharpoons\] CuCO\(_3\) (s) + 2Na\(^+\) (aq) + 2Cl\(^-\) (aq)
4. CO\(_3^{2-}\) (aq) + Cu\(^{2+}\) (aq) \[\rightleftharpoons\] CuCO\(_3\) (s)

6. A **weak acid** is a compound which when placed in water:
   
   1. leads to production of some OH\(^-\)
   2. dissociates completely to produce H\(^+\)
   3. **dissociates slightly to produce H\(^+\)**
   4. is insoluble

7. When acids and bases are **mixed** together they:
   
   1. explode
   2. precipitate
   3. **generate water**
   4. don't mix well

8. Reactions in water which **produce gases** tend to:
   
   1. be unfavorable
   2. **be favorable**
   3. be exothermic
4. be rare

Why??

9. The redox state of $\text{Fe}$ in $\text{FeCO}_3$ is:

1. -1
2. 0
3. +1
4. $+2$
5. +3

10. In the reaction: $\text{Fe}_2\text{O}_3 (s) + 2\text{Al} (s) \rightleftharpoons 2 \text{Fe} (l) + \text{Al}_2\text{O}_3 (s)$, the **oxidizing agent** is:

1. $\text{Fe}_2\text{O}_3$
2. $\text{Fe}$
3. $\text{Al}_2\text{O}_3$
4. $\text{Fe}_2\text{O}_3$ and $\text{Al}_2\text{O}_3$
5. $\text{Al}_2\text{O}_3$
6. none of the above

11. Which solution has the highest concentration of $\text{H}^+$:

1. $\text{pH} = 3$
2. $\text{pH} = 5$
3. $\text{pH} = 7$
4. $\text{pH} = 9$
5. pH = 12

12. Which set below has examples of (only) kinetic energy:
   1. thermal energy, mechanical energy, electric energy
   2. thermal energy, bond energy, electrostatic energy
   3. gravitational energy, bond energy, electrostatic energy
   4. gravitational energy, thermal energy, electric energy

13. Which set below has examples of (only) potential energy:
   1. thermal energy, mechanical energy, electric energy
   2. thermal energy, bond energy, electrostatic energy
   3. gravitational energy, bond energy, electrostatic energy
   4. gravitational energy, thermal energy, electric energy

14. In an exothermic process:
   1. work is performed on the surroundings
   2. heat is transferred to the surroundings
3. work is performed on the system
4. heat is transferred to the system

15. Specific heat capacity refers to:

1. the heat given off per mole of reaction
2. the heat given off per gram of reaction
3. **the heat required to raise the temperature of one gram of a substance by 1 K**
4. the heat required to raise the temperature of one mole of a substance by 1 K

16. The term state refers to:

1. the system being studied - not the surroundings
2. **liquid, gas, or solid**
3. animal, vegetable, or mineral
4. initial conditions
5. final conditions

17. The heat of fusion is:

1. the energy required to fuse 1 mole of two molecules together
2. **the energy required to convert, at its melting point, 1 mole of a substance in the liquid state into the solid state**
3. the energy required to convert, at its melting point, 1 mole of a substance in the solid state
into the liquid state

18. Change in **internal energy** is best described as:

1. \( \Delta H \)
2. \( q \)
3. \( w \)
4. \( q+w \)
5. \( \Delta G \)

19. A positive value of \( \Delta E \) means that:

1. heat is transferred to the surroundings
2. heat is transferred to the system
3. energy in the form of heat and/or work is transferred to the surroundings
4. **energy in the form of heat and/or work is transferred to the system**

20. When one **pushes down** on a bicycle pump connected to a tire at 80 psi:

1. **Work is performed on the pump/tire system**
2. Work is performed by the pump/tire system
3. No net work is performed