

Two isotopes of potassium are listed below.



1. State one similarity between potassium-37 and potassium-42 *in terms of subatomic particles*.

potassium-37 and potassium-42 have the same number of protons

2. *In terms of subatomic particles*, state one difference.

potassium-37 and potassium-42 have different numbers of neutrons

3. Compare ${}^{37}\text{K}$ and ${}^{42}\text{K}$ *in terms of radioactive decay*.

${}^{37}\text{K}$ and ${}^{42}\text{K}$ have different decay modes

-or-

${}^{37}\text{K}$ is positron decay and ${}^{42}\text{K}$ is beta decay

4. *In terms of half life*, how are ${}^{37}\text{K}$ and ${}^{42}\text{K}$ different?

${}^{37}\text{K}$ and ${}^{42}\text{K}$ have different half lives

-or-

${}^{37}\text{K}$ has a half life of 1.23 seconds and ${}^{42}\text{K}$ has a half life of 12.4 hrs

Given the following equilibrium reaction:



5. *In terms of the collision theory*, state why adding extra N_2 produces more NH_3 more N_2 molecules means more molecules present to potentially collide, thus producing more NH_3

6. *In terms of LeChatelier's principle*, state why adding extra N_2 produces more NH_3 adding N_2 makes the equilibrium reaction shift to relieve this stress, thus producing more NH_3
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7. In terms of *ground state, excited state, and energy transitions*, explain how a bright line spectrum is produced.

When an electron returns to the ground state from the excited state, energy is released, thus producing a visible bright line spectrum

(or some variation thereunto)

8. State the relationship between *molar mass* and boiling points
Larger molar mass, higher boiling point (in general)
9. State the relationship between *intermolecular forces* and boiling points
Stronger intermolecular forces, higher boiling point
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10. *In terms of valence electrons*, why is Li more like Fr than Be?
Li has the same number of valence electrons as Fr and not the same as Be
11. *In terms of chemical activity*, why is Ba more like Fr than Be?
Ba is at the bottom of a metal family where the more active metals are located, as is Fr, and Be is at the top, where less active metals are located
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- When NaCl is dissolved in water, the temperature of the solution decreases.**
12. Explain this statement *in terms of heat flow*.
Heat flows from high heat to low heat and in this case from the solution into the NaCl
13. Explain this statement *in terms of average kinetic energy*.
The average kinetic energy of the solution has decreased
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- NaCl has a higher melting point than C₆H₁₂O₆**
14. Explain this statement *in terms bonding*.
NaCl is an ionic substance, which have higher melting points than covalently bonded substances
15. Explain this statement *in terms of intermolecular forces*.
NaCl must have stronger intermolecular forces than the C₆H₁₂O₆, causing a higher melting point
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16. *In terms of valence electrons*, explain why copper is a conductor.
Cu is a conductor because it has loosely held electrons which are free to move (conduct)
17. *In terms of location on the periodic table*, explain why copper is a conductor.
Cu is a conductor because it is on the metal side of the periodic table and metals are conductors
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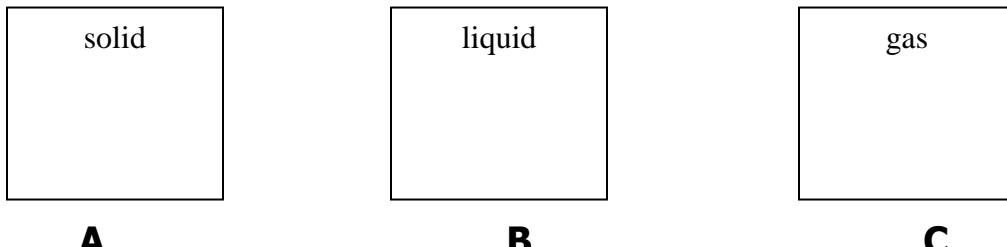
18. CH₄ will not dissolve in water, but NH₃ will dissolve in water. Explain the solubility of NH₃ *in terms of molecule polarity*. Include both water and NH₃ in the answer.

Water is a polar molecule and NH_3 is also a polar molecule. Molecules of similar polarities will dissolve in each other.

Chemical X has a boiling point of 75 °C
Chemical Y has a boiling point of 126 °C

23. Explain this difference in boiling points *in terms of intermolecular forces*.
Chemical X has weaker intermolecular forces than Chemical Y

24. Explain this difference in boiling points *in terms of heats of vaporization*.
Chemical X has a lower heat of vaporization than Chemical Y



19. Name the phase change from A to B melting

20. Explain the difference in particles from A to B *in terms of energy.*
energy is increasing from A to B

21. Explain the change from A to B *in terms of particle arrangement.*
from A to B, the particles are spreading out
from A to B, the particles are less organized and do not have a rigid arrangement

22. Explain the difference between A and B *in terms of intermolecular forces.*
the intermolecular forces in A are stronger than in B