

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

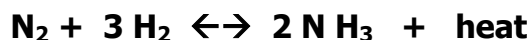
4. *In terms of half life,* how are ${}^{37}\text{K}$ and ${}^{42}\text{K}$ different?

${}^{37}\text{K}$ 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

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

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

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

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

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

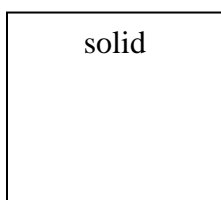
18. CH_4 will not dissolve in water, but NH_3 will dissolve in water. Explain the solubility of NH_3 *in terms of molecule polarity*. Include both water and NH_3 in the answer.

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

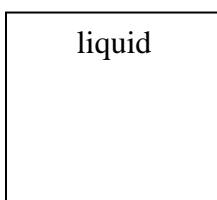
Chemical X has a boiling point of 75 °C
Chemical Y has a boiling point of 126 °C

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

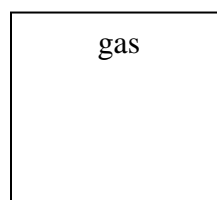
24. Explain this difference in boiling points *in terms of heats of vaporization*.
Chemical X has a lower heat of vaporization than Chemical Y



A



B



C

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