

Chemistry 20 - Intermolecular Forces Worksheet

Chemical Formula	Number of electrons	Boiling point (°C)	dipole-dipole forces?	London Dispersion?	hydrogen bonding?
1. F _{2(g)}		-188		√	
2. Cl _{2(g)}		-35		√	
3. Br _{2(l)}		59		√	
4. I _{2(s)}		184		√	
5. ClF _(g)		-101		√	
6. BrF _(g)		-20		√	
7. BrCl _(s)		5		√	
8. ICl _(s)		97		√	
9. IBr _(s)		116		√	
10. CH _{4(g)}		-162		√	
11. C ₂ H _{6(g)}		-87		√	
12. C ₃ H _{8(g)}		-45		√	
13. C ₄ H _{10(g)}		-0.50		√	
14. C ₅ H _{12(l)}		36		√	
15. CF _{4(g)}		-129		√	
16. CCl _{4(l)}		77		√	
17. CBr _{4(s)}		189		√	
18. CH ₃ F _(g)		-78		√	
19. CH ₃ Cl _(g)		-24		√	
20. CH ₃ Br _(g)		3.6		√	
21. CH ₃ I _(l)		43		√	
22. CH ₃ OH _(l)		65		√	
23. C ₂ H ₅ F _(g)		-38		√	
24. C ₂ H ₅ Cl _(g)		13		√	
25. C ₂ H ₅ Br _(l)		38		√	
26. C ₂ H ₅ I _(l)		72		√	
27. C ₂ H ₅ OH _(l)		78		√	

28. Following the example given in class, compare the boiling points of $\text{BrF}_{(g)}$ and $\text{C}_3\text{H}_{8(g)}$. Account for any differences.
29. Dimethyl ether, $(\text{CH}_3)_2\text{O}_{(g)}$ has a boiling point of -24.9°C . Compare with the boiling point of ethanol ($\text{C}_2\text{H}_5\text{OH}_{(l)}$) and account for the difference. **Hint:** Even though these compounds each have 2 C's, 6 H's and 1 O they are not the same compound! *You will need to look at their structures and include them with your answer.*
30. The different **series** of substances in the table (separated by), **in general** have increasing boiling points with increasing numbers of electrons. Explain this in terms of number of electrons and strength of intermolecular forces.
31. Methanol, CH_3OH , and ethanol, $\text{C}_2\text{H}_5\text{OH}$, each have the least number of electrons but the highest boiling point in their respective **series**. Account for this.
32. Explain the difference in boiling points between:
- | | |
|---|---|
| a) C_2H_6 and CH_3F | c) BrCl and $\text{C}_2\text{H}_5\text{F}$. |
| b) HF (20°C) and C_4H_{10} | |