

Melting Points and Boiling Points of Alkanes

The boiling points and melting points of alkanes show a definite pattern especially within a single homologous series. The table below give the boiling points and melting points of the first 20 straight-chain alkanes:

Alkane	m.pt. (°C)	b.pt. (°C)
CH ₄	-183	-162
C ₂ H ₆	-172	-88
C ₃ H ₈	-188	-42
C ₄ H ₁₀	-138	0
C ₅ H ₁₂	-130	36
C ₆ H ₁₄	-95	69
C ₇ H ₁₆	-91	98
C ₈ H ₁₈	-57	126
C ₉ H ₂₀	-54	151
C ₁₀ H ₂₂	-30	174
C ₁₁ H ₂₄	-26	196
C ₁₂ H ₂₆	-10	216
C ₁₃ H ₂₈	-5	235
C ₁₄ H ₃₀	6	254
C ₁₅ H ₃₂	10	271
C ₁₆ H ₃₄	18	287
C ₁₇ H ₃₆	22	302
C ₁₈ H ₃₈	28	317
C ₁₉ H ₄₀	32	331
C ₂₀ H ₄₂	36	344

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Questions:

1. Plot these data on a graph of temperature, (one of m.p, and one of b.p) vs. number of carbon atoms, on the same graph paper, using the same axis.
2. Which compounds are gases at about 25°C? Which are solids at the same temperature?
3. What general trends do you notice for the boiling points and melting points?
4. How could the general trends be explained?
5. What differences do you see in the two sets data?
6. Use your graph to estimate the boiling point of undecane and dodecane.