

Alkanes: Physical Properties

Your task

1. The table below shows some physical data (density and boiling point) for some alkanes. Complete the table.

Alkane	Density (g cm ⁻³)	T _b (K)	Number of carbon atoms
methane	0.466	109.1	
ethane	0.572	184.5	
propane	0.585	231.0	
2-methylpropane	0.557	261.4	
butane	0.601	272.6	
2,2-dimethylpropane	0.591	282.6	
2-methylbutane	0.620	301.0	
pentane	0.626	309.2	
2-methylpentane	0.653	333.4	
hexane	0.660	342.1	
2-methylhexane	0.679	363.1	
heptane	0.684	371.5	
2-methylheptane	0.698	390.7	
octane	0.703	398.8	
nonane	0.718	423.9	
decane	0.730	447.2	
undecane	0.740	469.1	
dodecane	0.749	489.4	
hexadecane	0.775	560.1	
eicosane	0.789	616.9	

2. Plot a graph (or graphs) to show the way in which each physical property changes with increasing number of carbon atoms. The number of carbon atoms should be on the horizontal axis.

Label any unusual points on your graph(s).

Now answer the following questions as fully as you can using information from your graph or graphs.

3. How does the **size** of alkane molecule affect the density and the boiling point?
4. How does the **shape** of the alkane molecule affect these physical properties? Consider in turn:
 - straight chain alkanes;
 - single branch alkanes;
 - double branch alkanes.