





# Chemistry for the gifted and talented

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## Crude oil Su Doku

### Puzzle 1

In *Crude oil Su Doku* you need to use logic to work out the contents in the blank squares.

Every row, column and 3x3 box contains the name or use of nine different fractions of crude oil. The type of information in each 3x3 box is either: the name of the fraction or its use.

For example, in the top left 3x3 box, the information about bitumen (name or use) has to be in the middle column because the other two columns have *bitumen* (or its use – *roads*) in them already. Of the two blank squares in the middle column it has to be the lower one because the other row has *roads* already in it. The top left 3x3 box contains names, rather than uses, so we would write *bitumen* into the middle bottom square of the 3x3 box.

Because different crude oils can give different fractions and different text books can give different information, the Su Doku puzzle is based on the following data:

fraction	use
refinery gas	camping gas
petrol	fuel – cars
naphtha	petrochemical feedstock
kerosene	fuel – planes
diesel	fuel – trains
lubricating oil	lubricating engine parts
fuel oil	fuel – ships
paraffin waxes	candles
bitumen	roads

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## Puzzle 1

kerosene	paraffin waxes	refinery gas	fuel - cars	camping gas	roads	diesel	petrochemical feedstock	bitumen
lubricating oil								naphtha
	fuel – ships		naphtha		kerosene	fuel – ships		
		roads					roads	
	camping gas			petrol				refinery gas
petrol			candles		lubricating engine parts	bitumen		
bitumen	diesel	naphtha		petrochemical feedstock			lubricating oil	fuel oil

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## Puzzle 2

In *Crude oil Su Doku* you need to use logic to work out the contents in the blank squares.

Every row, column and 3x3 box contains information about nine different fractions of crude oil. The type of information in each of the 3x3 boxes is either: the name of the fraction, its use or the range of carbon atoms per molecule in the fraction.

Because different crude oils can give different fractions and different textbooks can give different information, the Su Doku puzzle is based on the following data.

fraction	use	number of carbon atoms per molecule (approximate)
refinery gas	camping gas	1–4
petrol	fuel – cars	5–9
naphtha	petrochemical feedstock	8–10
kerosene	fuel – planes	11–16
diesel	fuel – trains	16–20
lubricating oil	lubricating engine parts	20–30
fuel oil	fuel – ships	30–40
paraffin waxes	candles	40–50
bitumen	roads	>50

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## Puzzle 2

naphtha	bitumen		camping gas	lubricating engine parts		kerosene	paraffin waxes
paraffin waxes	kerosene	roads		fuel – trains		lubricating oil	petrol
refinery gas			fuel – planes				
	bitumen	1–4		40–50	fuel – cars		
						fuel – trains	
	refinery gas	20–30		11–16	petrochemical feedstock		
diesel	paraffin waxes	fuel – ships		camping gas		petrol	naphtha
petrol	refinery gas		candles			bitumen	fuel oil



## Crude oil Su Doku

### Puzzle 1

kerosene	paraffin waxes	diesel	fuel – ships	camping gas	petrochemical feedstock	lubricating oil	petrol	bitumen
fuel oil	naphtha	refinery gas	fuel - cars	lubricating engine parts	roads	diesel	kerosene	paraffin waxes
lubricating oil	bitumen	petrol	fuel – trains	fuel – planes	candles	refinery gas	fuel oil	naphtha
candles	fuel – ships	lubricating engine parts	bitumen	diesel	refinery gas	fuel – cars	petrochemical feedstock	fuel – planes
fuel – trains	fuel – cars	roads	naphtha	paraffin waxes	kerosene	fuel – ships	camping gas	lubricating engine parts
petrochemical feedstock	camping gas	fuel – planes	lubricating oil	petrol	fuel oil	candles	roads	fuel – trains
petrol	lubricating oil	fuel oil	fuel – planes	roads	fuel - trains	naphtha	paraffin waxes	refinery gas
refinery gas	kerosene	naphtha	candles	fuel – ships	lubricating engine parts	bitumen	diesel	petrol
bitumen	diesel	paraffin waxes	camping gas	petrochemical feedstock	fuel cars	kerosene	lubricating oil	fuel oil

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## Puzzle 2

naphtha	bitumen	diesel	fuel – cars	camping gas	lubricating engine parts	fuel oil	kerosene	paraffin waxes
paraffin waxes	kerosene	fuel oil	roads	petrochemical feedstock	fuel – trains	refinery gas	lubricating oil	petrol
refinery gas	lubricating oil	petrol	candles	fuel – planes	fuel – ship	bitumen	naphtha	diesel
kerosene	naphtha	bitumen	1–4	16–20	40–50	fuel – cars	fuel – ships	lubricating engine parts
lubricating oil	petrol	paraffin waxes	8–10	30–40	>50	fuel – planes	fuel – trains	camping gas
fuel oil	diesel	refinery gas	20–30	5–9	11–16	petrochemical feedstock	candles	roads
bitumen	fuel oil	naphtha	fuel – trains	lubricating engine parts	fuel – cars	paraffin waxes	refinery gas	kerosene
diesel	paraffin waxes	kerosene	fuel – ships	roads	camping gas	lubricating oil	petrol	naphtha
petrol	refinery gas	lubricating oil	fuel planes	candles	petrochemical feedstock	diesel	bitumen	fuel oil