



# gridlocks – can you unlock the grid?

## Gridlock 2

Each row, column and 2 x 2 box contains information about each of the four halide reactions in the table.

sodium halide		obs. when conc. H <sub>2</sub> SO <sub>4</sub> is added	
NaCl			
		black solid, acidic gas formed, lead ethanoate paper darkened	
		Na <sub>2</sub> SO <sub>4</sub>	Na <sub>2</sub> SO <sub>4</sub> + SO <sub>2</sub> + Br <sub>2</sub>
	HBr		
hydrogen halide produced		other products	

## Gridlock 3

Each row, column and 2 x 2 box contains information about each of the four halides in the table.

sodium halide		obs. when conc. H <sub>2</sub> SO <sub>4</sub> is added	
NaF			black solid, acidic gas formed, lead ethanoate paper darkened
	NaI	no colour change, acidic gas	
	HBr		
		Na <sub>2</sub> SO <sub>4</sub>	
hydrogen halide produced		other products	

## Sodium halide reactions with conc. $\text{H}_2\text{SO}_4$ – answers

Before you answer the puzzle below fill in the table results of reaction of sodium halides with concentrated  $\text{H}_2\text{SO}_4$ .

sodium halide	observations when conc. $\text{H}_2\text{SO}_4$ is added	hydrogen halide produced	other products
NaF	no colour change, acidic gas	HF	$\text{Na}_2\text{SO}_4$
NaCl	no colour change, acidic gas	HCl	$\text{Na}_2\text{SO}_4$
NaBr	orange colour (gas/liquid) formed, acidic gas produced, and dichromate paper from orange to green	HBr	$\text{Na}_2\text{SO}_4 + \text{SO}_2 + \text{Br}_2$
NaI	black solid, acidic gas formed, lead ethanoate paper darkened	HI	$\text{Na}_2\text{SO}_4 + \text{H}_2\text{S} + \text{I}_2 + \text{SO}_2$

### Puzzle 1 – answers

Each row, column and 2 x 2 box contains information about each of the four halide reactions. Use your problem solving skills and the answers in the table above to fill in the blank boxes.

sodium halide		hydrogen halide produced	
NaCl	NaI	HBr	HF
NaBr	NaF	HI	HCl
HF	HBr	$\text{Na}_2\text{SO}_4$	$\text{Na}_2\text{SO}_4 + \text{H}_2\text{S} + \text{I}_2 + \text{SO}_2$
HI	HCl	$\text{Na}_2\text{SO}_4$	$\text{Na}_2\text{SO}_4 + \text{SO}_2 + \text{Br}_2$
hydrogen halide produced		other products	

# gridlocks – can you unlock the grid?

## Puzzle 2 – answers

Each row, column and 2 x 2 box contains information about each of the four sodium halides in the table.

sodium halide		obs. when conc. H <sub>2</sub> SO <sub>4</sub> is added	
NaCl	NaI	orange colour (gas/liquid) formed, acidic gas produced, and dichromate paper from orange to green	no colour change, acidic gas
NaBr	NaF	black solid, acidic gas formed, lead ethanoate paper darkened	no colour change, acidic gas
HI	HCl	Na <sub>2</sub> SO <sub>4</sub>	Na <sub>2</sub> SO <sub>4</sub> + SO <sub>2</sub> + Br <sub>2</sub>
HF	HBr	Na <sub>2</sub> SO <sub>4</sub>	Na <sub>2</sub> SO <sub>4</sub> + H <sub>2</sub> S + I <sub>2</sub> + SO <sub>2</sub>
hydrogen halide produced		other products	

## Puzzle 3 – answers

sodium halide		obs. when conc. H <sub>2</sub> SO <sub>4</sub> is added	
NaF	NaCl	orange colour (gas/liquid) formed, acidic gas produced, and dichromate paper from orange to green	black solid, acidic gas formed, lead ethanoate paper darkened
NaBr	NaI	no colour change, acidic gas	no colour change, acidic gas
HCl	HBr	Na <sub>2</sub> SO <sub>4</sub> + H <sub>2</sub> S + I <sub>2</sub> + SO <sub>2</sub>	Na <sub>2</sub> SO <sub>4</sub>
HI	HF	Na <sub>2</sub> SO <sub>4</sub>	Na <sub>2</sub> SO <sub>4</sub> + SO <sub>2</sub> + Br <sub>2</sub>
hydrogen halide produced		other products	