

Oil and sulfur fires around Mosul – health advice for the public

When crude oil burns it produces smoke containing a mixture of hazardous gases and particles. These include carbon dioxide, carbon monoxide, sulfur dioxide, oxides of nitrogen, volatile organic hydrocarbons, ozone, polycyclic aromatic hydrocarbons (PAHs), acidic aerosols, soot and droplets of unburned oil. Black smoke indicates a high soot content. The particulate matter in the smoke includes small diameter particles of 10 microns or less ($\leq PM_{10}$), which can penetrate and lodge deep inside the lungs. These may carry with them toxic components of the smoke.

When sulfur burns it generates fumes of sulfur dioxide and sulfur trioxide. These react with moisture to product sulfurous and sulfuric acids. The fumes are pungent and are irritating to human tissues especially the eyes, nose and respiratory tract. Sulfur dioxide is heavier than air and will tend to sink to the ground.

What are the effects of exposure?

Breathing in smoke or fumes can cause irritation to the nose, throat and lungs resulting in coughing, sneezing, runny nose and tightness of the chest. Nasal secretions may contain soot. People may also develop dizziness and headache. Exposure to high levels of fumes from sulfur fires can cause nausea, vomiting, stomach pain and corrosive damage to the airways and lungs.

People with asthma, other chronic respiratory illnesses and heart disease are more sensitive to the smoke and are more likely to develop health effects. Sulfur oxides can trigger asthma attacks even at low levels of exposure.

Children are especially at risk because they breathe proportionately more air than adults and they are closer to the ground where sulfur oxides and some other fumes accumulate. Children also have smaller airways that can more easily become blocked by swelling caused by corrosion than adults.

Skin contact may cause irritation and rashes. High exposure to sulfur oxides may cause blistering.

Eye contact can cause watering, stinging and redness of the eyes. High exposure to sulfur oxides can cause damage to the cornea, which may result in permanent injury.

How can you protect yourself?

You should take whatever action you can to avoid exposure. Depending on the circumstances you should:

1. Keep away from the fires. If you are outdoors cover your mouth and nose with a cloth and move upwind from the fire or crosswind to move away from the smoke. Note that a cloth over the nose and mouth will only provide minimal protection while you escape the smoke.

2. If possible, shelter indoors and close doors and windows and block off other openings to stop smoke entering the building. It is usually safer to stay indoors than to try and escape the smoke and risk getting trapped outside. If the smoke is from the sulfur fires it may help to move upstairs.

Note that by closing doors and windows you will have reduced the amount of ventilation in the building. You should therefore avoid burning charcoal, coal, wood, gas or other fuel for cooking or heating because when there is insufficient oxygen these fuels will produce toxic carbon monoxide gas.

3. If you or anyone else in the household has asthma or other respiratory illnesses or heart disease keep medications such as inhalers close to hand.
4. Soothe irritated skin and eyes by rinsing gently with clean tepid water, for about 15 minutes if possible.
5. Anyone who has difficulty breathing, severe eye irritation or blistering to the skin should be brought to medical attention as soon as possible.
6. Listen out for public service messages e.g. on the radio or look at social media for further advice.

Sources:

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