SODA LIME

Tips and Guide to Usage

What is Soda Lime?

Soda lime is a mixture of the chemicals NaOH and CaO, which comes in a white granular form. It is used in veterinary re-breathing anaesthetic machines. It's sole purpose is to remove carbon dioxide from exhaled gases to prevent CO_2 retention and carbon dioxide poisoning.

When the soda lime and carbon dioxide meet, a chemical reaction takes place involving the pH. The soda lime absorbs the carbon dioxide and the soda lime will change colour when this occurs.

How often should soda lime be changed

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What is Carbon Dioxide?

In your anaesthetised patient, carbon dioxide (CO_2) is exhaled. During respiration, within the lung's alveoli, a gaseous exchange occurs between inhalation and exhalation pauses. Carbon dioxide is expelled, while oxygen is absorbed into the bloodstream. As the patient exhales, CO_2 enters the circuit and eventually encounters your soda lime.

Should your soda lime surpass its capacity to absorb CO_2, and you continue using it, the exhaled CO_2 will cycle back to your patient via the re-breathing circuit. This situation might lead to hypercapnia, requiring higher use of inhalation agents and oxygen to maintain the appropriate anaesthetic depth and anaesthesia plane. This poses severe risks, potentially causing hypotension, reduced organ perfusion, cerebral oedema, renal failure, and even fatality.

DEPLETED SODA LIME CAN LEAD TO THE INSTABILITY OF ANAESTHETICS.

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How to measure Soda Lime usage?

You can track the amount of time (hours) that you have been using soda lime from recording your anaesthetics, which should be recorded on each individual anaesthetic chart. If this is too difficult to remember to tally up, you can use a usage chart. See attached **complimentary tracking and usage chart on the next page.**

Time U sage

As a general rule, if you've logged over 6 hours of active utilisation, it's time to assess and look at replacing the soda lime. If you don't reach the 6 hour threshold in over a couple of weeks, it's still prudent to still consider changing the soda lime. Over time, it may dry out, impacting its efficacy. Remember, the chemical reaction within soda lime depends on moisture for proper carbon dioxide absorption. For specific storage guidelines and the allowable duration the bottle can remain 'open' on the shelf, always consult the soda lime manufacturer's instructions. Maintaining optimal conditions ensures the effectiveness of your soda lime.

Visual Usage

You can also inspect for visual indicators.

Soda lime granules are colourless/white when fresh, and turn purple or pink (depending on the brand) when exhausted. This occurs due to pH changes in the granules. If 50% or more of your soda lime has changed colour, it needs changing. The beneficial thing about using the specific brand "Atrasorb" is that the colour change does not revert back at any stage. Whereas with some brands this can occur. Make sure you check the manufacturers guidelines.

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Are There Other Ways to Detect Depleted Soda Lime?

How it feels

MAKE SURE YOU WEAR GLOVES AND A MASK!

Gently pressing a granule between your fingers.
Fresh soda lime crumbles effortlessly.
Exhausted soda lime (with no further CO2 absorption ability) feels rigid and hard.

Additionally, active soda lime generates warmth during its chemical reaction. When conducting an anaesthetic procedure, a warm canister signifies operational soda lime. Conversely, if the canister remains cool, it is not working properly and needs changing.

Does your clinic use Capnography?

Your capnograph can serve as a very valuable tool in assessing your CO2 levels during patient exhalation. This feedback not only gauges soda lime efficiency but also provides vital patient data. Your aim should be maintaining an ETCO2 range of 35-40mmHg.
Some capnographs will also display inspiratory CO2 (PiCO2), which you want to maintain under 6mmHg. If the inspiratory CO2 level is reading higher you mean need to change the soda lime, as heightened inspired CO2 levels can indicate soda lime depletion.

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Why you need to change your Soda Lime regularly...

Have you ever noticed that Sodalime granules **change purple, then after use, the granules will change back to white.**

As the granules sit unused, the lack of moisture stops the purple colour (pH) change process and a different chemical process takes over, turning the granules back to white. Therefore, the granules could be nearly or completely exhausted, yet appear white (good for use). Using a combination of indicators will help you decide if it's time to change the Sodalime granules.

Replace the granules every 8-12 hours of use or when the Sodalime has been sitting unused in the anaesthesia machine for 48 hours or more.

Lack of heat production during use. However, heat does not affect the ability of the granules to absorb CO2. It's more of an indicator that the chemical process, absorption of CO2, is taking place. Some of the variables affecting heat generation are the patient's rate of carbon dioxide production, body size, metabolic rate, body temperature, and the ambient air temperature in the operating room.

Hard granules. Fresh soda lime granules feel soft and crumble when rubbed between thumb and fingers.

Replenish the absorbent when one-third to one-half of the granules undergo a colour change. On average this will be every 8-12 hours of use; however, it can become exhausted more quickly. Therefore, colour change should not be the only indicator relied upon.

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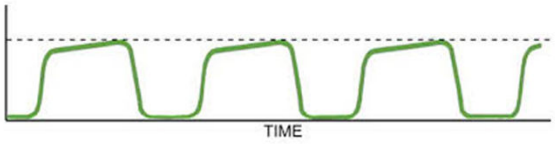
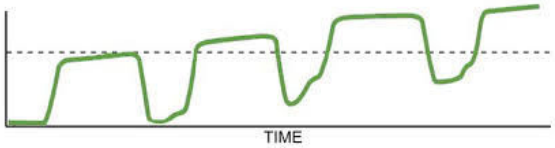
Why you need to change your Soda Lime regularly...

CAPNOGRAPHY INDICATORS FOR LOSS OF SODALIME ACTIVITY:

- An elevated iCO2 (inspired CO2) reading can be an indication of expired Sodalime granules.
- During inspiration, the base line does not return to zero.
- Elevated ETCO2 readings.



A NORMAL ETCO2 WAVEFORM



AN ABNORMAL WAVEFORM WHERE THE BASELINE IS NOT RETURNING TO ZERO.

Atrasorb PHARMA

HUMIDITY
17 +/- 1.0%

COMPOSITION
Calcium hydroxide, sodium hydroxide, water and indicator

PELLET
Approximately 4.5 mm

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Changing Soda Lime

Prior to replacement, remember these essential steps:

1. **Wear correct PPE:** Exhausted Soda lime is filled with CO2 and excess anaesthetic inhalant, which you need to avoid inhaling by wearing a mask and goggles. Soda lime can also be a skin irritant, so it is important to wear gloves and an apron.
2. **Proper Packing**: Place the new soda lime within the canister, ensuring a firm but not overly tight packing. Eliminate any air pockets between the granules. Avoid loose packing, which hampers CO2 absorption by letting gas take the easiest path.
3. **Balancing Density**: While a tight packing might increase circuit resistance and impede efficient ventilation, an overpacked canister is to be avoided. Most canister manufacturers advise leaving a slight gap at the top. The gap size should align with the canister's dimensions.
4. **Manufacturer Guidelines**: Always consult the specific instructions provided by both the canister and soda lime manufacturers. These guidelines should be your constant reference for accurate replacement.
5. **Maintain** your commitment to patient care by ensuring proper soda lime changes. Adhering to these guidelines guarantees efficient CO2 absorption and smooth ventilation for your patients.

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STEPS TO CHANGE SODA LIME

Perform the change in a well-ventilated area with low traffic.

1. Make sure you have correct PPE. Including gloves, goggles, mask and an apron.
2. Loosen the adjustment attachment on your soda lime canister.
3. Remove the canister, and empty the previous soda lime into the appropriate waste bin. If you pour the soda lime directly into a bin bag, double bag it and place in a chemical waste bin ASAP.
4. Using a damp cloth, wipe the canister including the seals. Clean off any residual powder to prevent leakage.
5. Fill the canister with new soda lime to the fill level indicator or approximately one centimetre from the top.
6. Put the canister back in place and tighten the set screw underneath.
7. Leak test your machine prior to use.
8. Label and record on your usage chart the changed date with your initials.

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Storage

Your soda lime needs to remain in a cool, well-ventilated area. Keep container tightly closed. Monitor the labelled expiry date. Discard if date has passed.

To ensure optimal storage, always follow the manufacturer's instructions. Additionally, if your soda lime remains within the canister for a significant duration, consider changing it regardless of whether it has yet reached 8-12 hours of use. This is because dehydrated soda lime lacks the ability to effectively absorb CO_2.

Implementing a "Soda Lime Usage Tracking Chart" in your clinic

It is vital to keep a track of when to change your soda lime. Here is a simple table you can download, print, laminate and keep next to your anaesthetic machine for easy recording.

See chart on next page

SODA LIME USAGE TRACKING CHART

Instructions

When using your circuit that incorporates soda lime, mark a cross and your initials within a rectangle after every 15 minutes of operation.

EACH RECTANGLE = 15 MINS OF USE
ONE LINE = 1 HOUR

DATE LAST CHANGED:_____

TIME TO ASSESS AND LOOK AT CHANGING SODA LIME