SIDS INITIAL ASSESSMENT PROFILE

CAS No.	___
Chemical Name	Bicarbonate special
Structural Formula	$NaHCO_3$ (CAS No. 144-55-8) Na_2CO_3 (CAS No. 497-19-8) NH_4HCO_3 (CAS No. 1066-33-7)

SUMMARY CONCLUSIONS OF THE SIAR

Bicarbonate special is a substance produced as a result of chemical reactions leading to a composition of 3 existing chemicals, namely sodium bicarbonate (mean: 81 %; range: 78 – 87 %), sodium carbonate (mean: 13 %; range: 5-15 %), and ammonium bicarbonate (mean: 3 %; range: 2-5 %). They are inorganic salts which rapidly dissolve in water and dissociate into their corresponding ions. Based on these similarities, endpoints of bicarbonate special can be assessed based on the available data for sodium bicarbonate, sodium carbonate and ammonium bicarbonate. SIDS Initial Assessment Reports are available for sodium bicarbonate, sodium carbonate and ammonium bicarbonate, which is made available at the same time as this report. The present document is a synthesis of the 3 reports, leading to an estimation of each of the SIDS elements for bicarbonate special.

Human Health

The substance should not be considered as dangerous regarding its acute toxicity by the oral and dermal exposure routes, however it is worth noting that is should be considered harmful if inhaled.

On account of the 5-15% of sodium carbonate, bicarbonate special should be considered as mildly irritating to the skin and to the eyes.

No adverse effects related to chronic treatment with any of the three chemicals were observed in mammals. All the three chemicals of bicarbonate special are considered to be “generally recognized as safe” (GRAS) by the FDA. Therefore, additional testing for repeated dose toxicity is not deemed necessary.

All the mutagenicity tests performed with the three chemicals gave negative results. Therefore, additional mutagenicity testing is not deemed necessary for bicarbonate special.

None of the 3 chemicals has been shown to induce reproductive effects, either if tested with mammals or if not through human experience. Therefore, the substance should not be considered as dangerous for reproductive effects and no further testing is deemed necessary.

According to the conclusions noted for all the above endpoints, bicarbonate special should not be considered as dangerous for human health.

Environment

Bicarbonate Special is a white, quite odourless, crystalline powder. As sodium bicarbonate is the major component (81%) most of the properties are quite similar, but bulk density is 2.14 g/cm^3 and water solubility is 100,3 g/L at 20°C. It decomposes starting at 30 - 35°C with first decomposition of ammonium bicarbonate and therefore melting point cannot be determined. The granulometry of particles indicate that 89% are > 45 µm.

The three chemical components of bicarbonate special are inorganic substances which decompose when heated, and are soluble in water where they dissociates into sodium, ammonium, carbonate and bicarbonate ions which are naturally present in the environment. Due to their physico-chemical properties, the vapor pressure, log Kow and

biodegradation values are not available.

Ammonia is naturally assimilated by most organisms for protein synthesis. Sodium, carbonate and bicarbonate ions are not expected to accumulate in living tissues. However, ammonia is a part of the nitrogen cycle in the environment and has indirect and long-term effects to the ecosystems, e.g. eutrophication, groundwater pollution, water and soil acidification with oxygen depletion. The acidifying effects on soil and water take place when ammonia ions are transformed into nitrate by micro-organisms, a so-called nitrification. In soil, if the nitrate is not absorbed by plants, and instead reaches the surface or groundwater, the acidifying effects increase. In the aquatic environment, nitrification, consuming four atoms of oxygen for every atom of nitrogen converted, can dramatically lower dissolved oxygen in the water resulting in adverse impacts on aquatic organisms.

Among the three components of bicarbonate special, the lowest relevant chronic toxicity value was obtained for ammonium bicarbonate with EC_{20}= 7.6 mg/L (*Lepomis macrochirus*, pH 8, 25°C). Sodium bicarbonate and sodium carbonate should not be considered as dangerous for aquatic organisms and only the toxicity of ammonium bicarbonate has to be taken into account. In the composition of bicarbonate special, ammonium bicarbonate is only present at 2-5 % and its contribution in the global toxicity of bicarbonate special would be low.
Because the natural pH, bicarbonate, carbonate and sodium concentrations (and also their fluctuations in time) vary significantly between aquatic ecosystems, it is not considered useful to derive a general PNEC or a $PNEC_{added}$. To assess the potential environmental effect of a bicarbonate special discharge, the variation of pH and the increase in sodium, carbonate, bicarbonate and ammonia should be compared with the natural values and their fluctuations and based on this comparison it should be assessed if the anthropogenic addition is acceptable.

Exposure

The global production of bicarbonate special in closed systems was approximately 5000 tonnes in 2004.

Bicarbonate special is produced for 2 intended uses: treatment of gas from incineration processes or from glass-maker furnaces, and animal feeding: bovine, porcine, ovine, providing sodium to animals.

The production and use of ammonium bicarbonate may result in inhalation, dermal and/or oral exposure.

It is obvious that the sodium, ammonium, carbonate and bicarbonate ions, and also ammonia have a wide natural occurrence. Significant direct emissions to the terrestrial environment or atmosphere are not expected during production and use of bicarbonate special. When used for animal feeding, bicarbonate special would be metabolized by animals before reaching soil.

RECOMMENDATION AND RATIONALE FOR THE RECOMMENDATION AND NATURE OF FURTHER WORK RECOMMENDED

Human Health: The chemical is currently of low priority for further work because of its low hazard profile.

Environment: The chemical is currently of low priority for further work. Based on the results of aquatic toxicity tests with the 3 chemical components of bicarbonate special, ammonium bicarbonate appears to be the most toxic component. As the concentration of ammonium bicarbonate is very low in bicarbonate special, the latter should not be considered in general as dangerous for the aquatic organisms. However, ammonia has indirect and long-term effects to the ecosystems, e.g. eutrophication, groundwater pollution and soil acidification due to the nitrification of ammonia