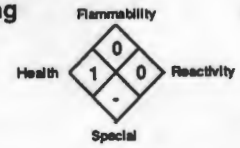
Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8854

School Materials Safety Manual:

No. 271 Benedict's Solution
Issued 5/91

♦SECTION 1 INTRODUCTION

Material Benedict's Solution, ca 100%
Chemical Formula Benedict's solution consists of approximately 69% water, 17% sodium citrate ($Na_3C_6H_5O_7$), 12% sodium carbonate (Na_2CO_3), and 2% copper sulfate ($CuSO_4$)
CAS Numbers 18996-35-5 (sodium citrate), 497-19-8 (sodium carbonate), 7758-98-7 (copper sulfate)
Synonyms None found
DOT Classification Not listed as a Hazardous Material for Transportation (49 CFR 172.101)
EPA Classification Not listed as a RCRA Hazardous Waste (40 CFR 261.33), a CERCLA Hazardous Substance (40 CFR 302.4), a SARA Extremely Hazardous Substance (40 CFR 355), or a SARA Toxic Chemical (40 CFR 372.65)
OSHA Classification Not listed as an Air Contaminant (29 CFR 1910.1000, Subpart Z/Table Z-1-A)
NFPA Hazard Rating Not found
Genium Hazard Rating
4 = Extreme
3 = High
2 = Moderate
1 = Slight
0 = Minimum



Description Light blue solution with no odor.
Overview Used in the chemistry laboratory for analysis of reducing sugars. Irritating to skin.
Manufacturer Always request an up-to-date MSDS from your chemical supplier. That sheet should include the substance's manufacturer and emergency phone numbers. This *Manual*'s Resources/Manufacturers Index lists some larger manufacturers and available emergency phone numbers.

♦SECTION 2 USE AND STORAGE DATA

Preliminary Planning Considerations *Plan and provide for safe disposal of all school-generated chemical waste.* Check applicable regulations prior to use. Provide adequate ventilation. Contact lens use in the laboratory is controversial. In some cases, soft lenses can actually protect eyes from chemicals. In other cases, chemical entrapment is presumed a possible hazard. Particles adhering to contact lens surfaces can cause corneal damage. For safety, always wear safety glasses or goggles. Wear rubber gloves to minimize skin contact. Employees and students should know the location of eyewash and shower facilities near where chemicals are used. Be sure eyewash stations and safety showers are in good working order.
Usage Precautions and Procedure Before using, *read this material's container label* and follow all precautions. Do not smoke in usage or storage areas. Practice good housekeeping to avoid unintentionally mixing incompatibles. Do not allow chemical residue or dust to accumulate in lab or work areas. Wear safety glasses or goggles and appropriate protective clothing to work with this substance. Keep this material away from notebooks, textbooks, and personal belongings to avoid transporting chemical residues from the lab/work area. After working with chemical materials, and before eating, drinking, or smoking, always wash hands and face. Remove and launder contaminated clothing before reusing.
Additional Data Benedict's solution is stable at room temperature under normal handling and storage conditions. It has an indefinite shelf life. It does not polymerize.
Preferred Storage Location and Methods Storage areas should be cool and well ventilated, and the containers *tightly closed* and out of direct sunlight. To separate incompatible chemicals, store by chemical family, not by alphabetical name. Protect all chemical containers from physical damage. Prohibit smoking in chemical storage areas.

♦SECTION 3 SPILL/DISPOSAL PROCEDURES

If Spilled Ventilate spill area. Clean up spilled material promptly and thoroughly. Cleanup personnel should protect against skin or eye contact. Cover with an inert solid absorbent (vermiculite, dry sand, etc.) and scoop into appropriate disposal containers (with a secure lid) for disposal in accordance with existing regulations. Dike the spill area with an inert absorbent material, as needed, to contain the spilled material.
Disposal of Small Quantities *Handle emptied containers carefully since residues may remain.* Always check regulations before disposal. Investigate recycling, reclamation, or destruction to a less hazardous material rather than disposal of untreated waste to a landfill. If this method is not practical, feasible, or in accord with existing regulations, contact your supplier or a licensed disposal contractor for specific treatment/disposal procedures.
Disposal of Larger Amounts Contact your supplier or a licensed disposal company.

Follow all applicable local, state, and Federal regulations for all waste disposal.

♦SECTION 4 HEALTH HAZARDS

Benedict's solution is irritating to the skin and eyes.

1990-91 ACGIH TLV None established
1990 NIOSH REL None established
1990 OSHA PEL None established
1985-6 Toxicity Data None listed for Benedict's solution. Copper sulfate: Rat, oral, LD_{50}: 300 mg/kg; Sodium carbonate: Rat, oral, LD_{50}: 4090 mg/kg; Sodium citrate: Rat, intraperitoneal, LD_{50}: 1348 mg/kg.
Carcinogenicity Not listed by the NTP, IARC, or OSHA
Acute Effects Direct contact with skin and eyes is irritating. Ingestion of large amounts may cause vomiting and diarrhea. Copper sulfate is a potent but unreliable emetic agent. If vomiting occurs, there is potential for toxicity from absorbed copper ion.
Chronic Effects None reported

♦SECTION 5 FIRST AID PROCEDURES

Eye Contact Promptly flush eyes with plenty of running water for at least 15 min, including under the eyelids. Get prompt medical attention.
Skin Contact Remove contaminated clothing. After flushing with large amounts of water, wash exposed areas with soap and water.
Inhalation Remove victim from exposure to fresh air and support breathing as necessary.
Ingestion Get *prompt* medical attention. Never give anything by mouth to an unconscious or convulsing person.

Get proper in-school, paramedic, or community medical attention and support.

♦SECTION 6 FIRE PROCEDURES AND DATA

Fire Hazards Fire produces toxic fumes. For major fires, or for fires involving large quantities, firefighters should wear appropriate protective clothing and respirators. A self-contained breathing apparatus (SCBA) is recommended. Do not release runoff to sewers or waterways.
Flash Point and Method None reported
Autoignition Temperature None reported
Flammability Limits in Air (vol. %) None reported
Hazardous Decomposition Products Thermal oxidative decomposition of Benedict's solution can produce toxic fumes of sodium oxide (Na_2O) and sulfur oxides (SO_x).
Extinguishing Media Use water fog, carbon dioxide, dry chemical, or alcohol type of foam or other media appropriate to surrounding fire conditions.

♦SECTION 7 PHYSICAL DATA

pH of Aqueous Solution Not found
Specific Gravity (H_2O = 1) Not found
For physical data on sodium carbonate and copper sulfate, see *SMSM,* Nos. 162 and 130, respectively.

References 124, 126, 132, 136, 527
Prepared by MJ Allison, BS
School Staff Review by JH Bartsch, MS
Industrial Hygiene Review by DJ Wilson, CIH
Medical Review by W Silverman, MD
Edited by JR Stuart, MS
