

**ICE GEL PACK: A REMEDY TO PAIN**Nehal Patel<sup>1</sup>, Kushal Nandi<sup>1</sup>, Dr. Dhruvo Jyoti Sen<sup>2\*</sup> and Dr. Dhananjay Saha<sup>3</sup><sup>1</sup>Department of Pharmaceutical Chemistry, JIS University, 81 Nilgunj Rd, Jagarata Pally, Deshpriya Nagar, Agarpara, Kolkata-700109, West Bengal, India.<sup>2</sup>School of Pharmacy, Techno India University, Salt Lake City, Sector-V, EM-4, Kolkata-700091, West Bengal, India.<sup>3</sup>Deputy Director, Directorate of Technical Education, Bikash Bhavan, Salt Lake City, Kolkata-700091, West Bengal, India.**\*Corresponding Author: Dr. Dhruvo Jyoti Sen**

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**ABSTRACT**

Using a cold compress or ice pack on a strained muscle can decrease inflammation and numb pain in the area. Icing is effective at reducing pain and swelling because the cold constricts blood vessels and decreases circulation to the area. Applying ice causes your blood vessels to narrow, decreasing blood flow to the area. In turn, this helps reduce the inflammation that causes swelling. Ice Power Cold Gel is an excellent aid to the treatment of rheumatism because it is not a medicine and therefore does not strain the body. It also reduces the need to use anti-inflammatory drugs.

**KEYWORDS:** Ice gel, Cold gel, Refrigerant gel, Ethylene glycol, Ammonium nitrate, Sodium polyacrylate.**INTRODUCTION**

An ice pack or gel pack is a portable bag filled with water, refrigerant gel, or liquid, meant to provide cooling. They can be divided into the reusable type, which works as a thermal mass and requires freezing, or the instant type, which cools itself down using chemicals but can only be used once. The instant type is generally limited to medical use as a cold compress to alleviate the pain of minor injuries, while the reusable type is both used as a cold compress and to keep food cool in portable coolers or in insulated shipping containers to

keep products cool during transport. The gel beads in ice packs are usually made of sodium polyacrylate, which can be irritating if swallowed. Some early reusable ice packs contained very toxic substances such as diethylene glycol or ethylene glycol (antifreeze).<sup>[1]</sup>

One bag contains water, while the other holds a chemical like calcium ammonium nitrate. When you shake or hit the pack, the internal bags break, causing the two substances to mix. This leads to an endothermic reaction which causes the pack to turn cold for several minutes.<sup>[2]</sup>

**Figure-1: Ice pack and Knee joint pain place.**

This medication is used to treat minor aches and pains of the muscles/joints (such as arthritis, backache, sprains). The gel in most freezer packs is non-toxic and

biodegradable; it is usually a polymer or cellulose. Some products may also include additives like preservatives, sodium chloride, minerals, water, or dye. Gel packs

freeze at a lower temperature than ice and generally last longer than ice.<sup>[3]</sup> The length of time it can remain frozen varies based on the size, shape, temperature exposure, and how you are packing a shipment/cooler. The gel beads in ice packs are usually made of sodium polyacrylate, which can be irritating if swallowed. Some early reusable ice packs contained very toxic substances such as diethylene glycol or ethylene glycol (antifreeze). These types of ice packs have been recalled and are generally no longer available. Hence, sodium polyacrylate is one of the chemicals used in ice pack.<sup>[4]</sup>

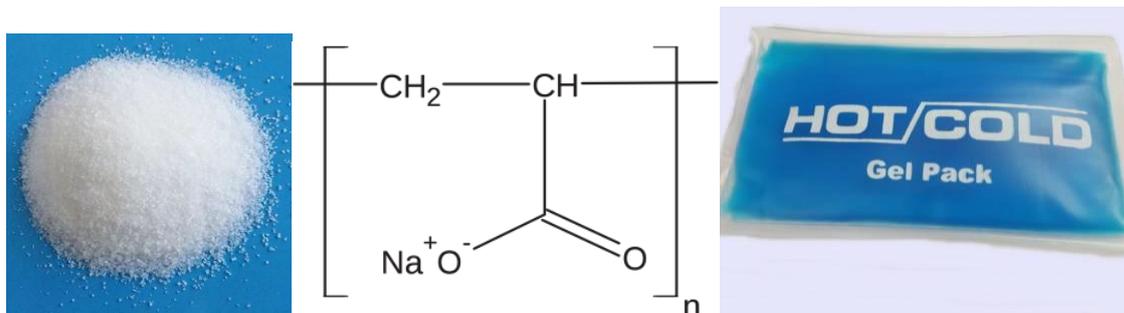
While ammonium nitrate is common in old version of ice pack, the new modern version of ice pack also uses ammonium chloride. Reusable ice packs are usually transparent plastic bags containing gel - which can be chilled but also heated, if necessary. They are also known as gel packs and are usually composed of: water, a thickening agent, a freezing agent, silica gel, a non-toxic dye (usually blue). Of these ingredients, the temperature-lowering agent is the one which causes the greatest concern if ingested - most of the time consisting of propylene glycol.<sup>[5]</sup>



**Figure-2: Apply of ice pack in pain place.**

Reusable ice cubes or bags containing gel beads are another type of instant ice. The reusable cubes are usually filled with distilled water, while the small gel spheres are made of sodium polyacrylate, which is toxic if swallowed. Pay special attention when using this type of gel pack, especially around children. If any of the products listed above are swallowed, you must contact your doctor or go to a hospital. In small doses, contact with the mouth and small ingested amounts can be

neutralised by rinsing and drinking water often. Should any of the substances briefly contact the eyes, rinse them gently with room temperature water for about 15 minutes. If discomfort or pain persists, you must contact a doctor. Hazardous contact between skin and chemicals can be alleviated by washing the affected area with soap and water. For any doubts or questions to this regard, you must always seek the care of a doctor who will be able to advise you on the best treatment.<sup>[6]</sup>



**Figure-3: Sodium Poly Acrylate.**

Sodium polyacrylate (ACP), also known as waterlock, is a sodium salt of polyacrylic acid with the chemical formula  $[-\text{CH}_2-\text{CH}(\text{CO}_2\text{Na})-]_n$  and has broad applications in consumer products. This super-absorbent polymer (SAP) has the ability to absorb 100 to 1000 times its mass in water. IUPAC: Poly(sodium prop-2-enoate) CAS: 9003-04-7.

## CONCLUSION

To be prepared for use, the pack is first placed in a freezer. Both ice and other non-toxic refrigerants (mostly water) can absorb a considerable amount of heat before

they warm above 0°C (32°F). Ice packs are used in coolers to keep perishable foods (especially meats, dairy products, eggs, etc.) below the 5–75°C (41–167°F) danger zone when outside a refrigerator or freezer, and to keep drinks pleasantly cool. The amount of ice needed varies with the amount of food, its initial temperature, the thermal insulation of the cooler, and the ambient temperature and exposure to direct sunlight. Ice initially well below freezing temperature will last a little longer. Water has a much higher latent heat of fusion than most substances, and a melting temperature which is convenient and easily attained with, for example, a

household freezer. Additives to improve the properties of water are often used. For example, substances can be added to prevent bacterial growth in the pack, or to prevent the water from solidifying so it remains a thick gel throughout use. Hot-or-cold packs are ice packs that are rated for high temperature use. They can be used as a normal reusable ice pack by storing in a freezer, but they can also be heated in water or a microwave oven to reach the desired temperature. The first hot and cold pack was introduced in 1948 with the name *Hot-R-Cold-Pak* and could be chilled in a refrigerator or heated in hot water. The first reusable hot cold pack that could be heated in boiling water or a microwave oven was first patented in 1973. An instant cold pack is a single-use device that consists of two bags; one containing water, inside a bag containing ammonium nitrate, calcium ammonium nitrate or urea. When the inner bag of water is broken by squeezing the package, it dissolves the solid in an endothermic process. This process absorbs heat from the surroundings, quickly lowering the pack's temperature. Instant cold packs are a convenient direct replacement for crushed ice used as first aid on sport injuries, and can be carried as first aid to remote or wilderness areas where ice is unavailable or not appropriate for the situation. Gel packs have been made with diethylene glycol and ethylene glycol. Both can cause illness if ingested in large amounts, making them unsuitable for use with food. The US Consumer Product Safety Commission recalled such packs.

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