Sodium acetate
Newborn use only

2023

Alert	In Australia, it is available as sodium acetate 16.4% (2 mmol/mL of acetate). It has an osmolarity of 4000 mOsm/L. Concentrated sodium acetate ampoules **MUST BE DILUTED** prior to use.(1) Calculated osmolarity of sodium acetate – half strength, standard strength and high strength in this formulary are 160 mOsm/L, 320 mOsm/L and 1000 mOsm/L respectively. These osmolarities are similar to sodium chloride 0.45%, 0.9% and 3% respectively.(2, 3) (Refer to special comments section).
Indication	1. Metabolic acidosis: Prevention and treatment 2. Hyponatraemia: An alternative source of correction in the presence of acidosis. 3. Maintenance of arterial line patency
Action	Acetate is an alkalinising agent and can be used to increase plasma bicarbonate concentration and correct metabolic acidosis. (4) Acetate is metabolised in the liver to bicarbonate.
Drug type	Electrolyte
Trade name	DBL Sodium acetate concentrated injection
Presentation	Sodium acetate concentrated injection 10 mL glass ampoule: Contains 1.64 gram/10 mL sodium acetate. This is equivalent to sodium acetate 16.4%.(1) Each 1 mL contains 2 mmol acetate and 2 mmol sodium.
Dose	**Intravenous correction for metabolic acidosis** 1-3 mmol/kg/day. Dose beyond 3 mmol/kg/day may be used at the discretion of treating team. **Arterial line patency for infants ≤ 1.5 Kg#** As a routine intra-arterial line infusion (prevention of metabolic acidosis) (ANMF consensus) < 1 Kg: sodium acetate half strength* with heparin 1 unit/mL at 0.5 mL/hour. 1-1.5 Kg: sodium acetate standard strength* with heparin 1 unit/mL at 0.5 mL/hour. *Half strength and standard strengths are similar in osmolarity to sodium chloride 0.45% and 0.9% respectively. #There may be clinical situations where **standard strength** sodium acetate is used in arterial line infusion to correct metabolic acidosis in infants>1.5 Kg.
Dose adjustment	No information.
Maximum dose	No information.
Total cumulative dose	No information.
Route	Intravenous, intra-arterial.
Preparation	**Intravenous correction for metabolic acidosis** **Sodium acetate – Standard strength*** Add 4 mL of sodium acetate (8 mmol) to 46 mL of water for injection to make a final volume of 50 mL with a concentration of 0.16 mmol/mL. 1 mmol/kg/day = 0.26 ml/kg/hour **Sodium acetate – High strength* (central line preferred)** Add 12.5 mL of sodium acetate (25 mmol) to 37.5 mL of water for injection to make a final volume of 50 mL with a concentration of 0.5 mmol/mL (25 mmol/ 50 ml). 1 mmol/kg/day = 0.08 ml/kg/hour *standard and high strengths are similar in osmolarity to sodium chloride 0.9% and 3% respectively. **Arterial line patency (heparin added) for infants ≤ 1.5 Kg** **Sodium acetate – Half strength* (for weight < 1 Kg):** Draw up 2 mL of sodium acetate (equivalent to 4 mmol of acetate), add 5 mL of Heparinised Saline (50 units), and add to 43 mL of water for injection to make a final volume of 50 mL with a concentration of 0.08 mmol/mL of sodium acetate.

Sodium acetate – Standard strength* (for weight 1-1.5 kg):
Draw up 4 mL of sodium acetate (equivalent to 8 mmol of acetate), add 5 mL of Heparinised Saline (50 units), and add to 41 mL of water for injection to make a final volume of 50 mL with a concentration of 0.16 mmol/mL of sodium acetate.

*Half strength and standard strengths are similar in osmolarity to sodium chloride 0.45% and 0.9% respectively.

Sodium and acetate provided in mmol/kg/day with the above **intra-arterial** line infusion:

Weight	Sodium acetate strength	Rate	mmol/kg/day
500 g	Half strength	0.5 mL/hour	1.9 mmol/kg/day
750 g			1.2 mmol/kg/day
1000 g			0.9 mmol/kg/day
500 g	Standard strength	0.5 mL/hour	3.8 mmol/kg/day
750 g			2.5 mmol/kg/day
1000 g			1.9 mmol/kg/day
2000 g			0.95 mmol/kg/day

Administration	Continuous infusion
Monitoring	Electrolytes, acid base status (bicarbonate, base excess, pCO2)
Contraindications	Hypernatraemia Fluid overload
Precautions	Renal impairment
Drug interactions	
Adverse reactions	Metabolic alkalosis Hypernatraemia Fluid overload Aluminium toxicity from leaching of aluminium from glass ampoules.(5)
Compatibility	Fluids: Glucose 5%, sodium chloride 0.9%, Amino acid solutions, lipid emulsion (6) Y site: aciclovir, alfentanil, allopurinol, amifostine, amikacin, aminophylline, ampicillin, anidulafungin, asparaginase, atenolol, atracurium, azithromycin, aztreonam, buprenorphine, busulfan, calcium folinate, calcium gluconate, capreomycin, cefazolin, cefepime, cefotaxime, cefoxitin, ceftazidime, ceftriaxone, cefuroxime, clindamycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydramine, dobutamine, dopamine, doxycycline, enalaprilat, ephedrine, adrenaline (epinephrine), erythromycin lactobionate, esmolol, fentanyl, fluconazole, fluorouracil, foscarnet, fosphenytoin, furosemide, ganciclovir, gentamicin, heparin, hydrocortisone, imipenem-cilastin, labetalol, levofloxacin, lidocaine (lignocaine), linezolid, lorazepam, magnesium sulfate, methadone, methotrexate, methylprednisolone, metronidazole, milrinone, morphine, naloxone, netilmicin, nitroprusside sodium, octreotide, ondansetron, pamidronate, pancuronium, pentobarbital, phenobarbital (phenobarbitone), phenylephrine, piperacillin-tazobactam, potassium chloride, propranolol, ranitidine, remifentanil, rocuronium, sodium bicarbonate, suxamethonium, sulfamethoxazole-trimethoprim, tacrolimus, theophylline, ticarcillin, tobramycin, vancomycin, vasopressin, vecuronium, verapamil, voriconazole, zidovudine
Incompatibility	Fluids: No information. Y site: Amiodarone, amphotericin B conventional colloidal and lipid complex, caspofungin, diazepam, hydralazine, mycophenolate mofetil, pantoprazole, phenytoin
Stability	
Storage	Store below 30°C. Single use only. Replace syringe every 24 hours.
Excipients	Water for injection
Special comments	

Solution	Electrolyte (mmol/mL)	Osmolarity (mOsm/L)
Human Plasma		280-300
Sodium acetate 16.4%	2 mmol/mL of Na	4000

	Sodium chloride 0.45%	0.08 mmol/mL of Na	154
	Sodium chloride 0.9%	0.15 mmol/mL of Na	308
	Sodium chloride 3%	0.51 mmol/mL of Na	1027
	Sodium acetate half strength	0.08 mmol/mL of Na and acetate	160
	Sodium acetate standard strength	0.16 mmol/mL of Na and acetate	320
	Sodium acetate high strength	0.5 mmol/mL of Na and acetate	1000
	Sodium bicarbonate 8.4%	1 mmol/mL of Na and bicarbonate	2000
	Sodium bicarbonate 4.2%	0.5 mmol/mL of Na and bicarbonate	1000

Evidence

Background

Sodium acetate is similar to bicarbonate in its ability to restore blood pH and plasma bicarbonate.(7) It can also be used as the source of sodium in parenteral nutrition solution in preterm neonates.

Efficacy

In a prospective study by Ekblad et al, 11 infants ≤ 34 weeks were supplemented with sodium acetate added to the daily intravenous fluids from day 1 of life. Sodium acetate was used as the sole source of sodium on day 1 of life and both sodium chloride and sodium acetate were used in equal amounts as the source of sodium from day 2 of life. Actual intakes of sodium acetate on day 1 and thereafter were 3 mmol/kg/day and 1.5 mmol/kg/day respectively. They demonstrated an improvement in metabolic acidosis (less number of infants with pH < 7.3) without any worsening in PCO_2. Serum sodium was normal in all infants.(8) In a double blind randomised controlled trial, Ali et al compared the parenteral nutrition (PN) solutions containing sodium acetate or sodium chloride on biochemical parameters and clinical outcomes in 52 infants < 33 weeks including 29 extremely low birth weight infants <1000 g. PN was prepared based on 2005 ESPGHAN guidelines. The intervention arm received sodium acetate as the entire source of sodium whereas the control arm received sodium chloride as the source of sodium. In the first 6 days of life, intervention arm received mean intake of sodium (and acetate) 4 mmol/kg/day. Blood pH and base excess rose to normal values after 3 days of PN in the acetate group. There was no significant difference in pCO_2 between groups. There was a significantly lower incidence of bronchopulmonary dysplasia in the acetate group. There was also a trend towards lower incidence of severe intraventricular haemorrhage.(7)

Pharmacokinetics

Following administration acetate is metabolised in liver to bicarbonate.

Practice points

References

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