

Alert	In Australia, it is available as sodium acetate 16.4% (2 mmol/mL of acetate). It has an osmolality of 4000 mOsm/L. Concentrated sodium acetate ampoules MUST BE DILUTED prior to use. ¹ Calculated osmolality 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 osmolalities are similar to sodium chloride 0.45%, 0.9% and 3% respectively. ^{2,3} (Refer to special comments section).
Indication	<ol style="list-style-type: none"> 1. Metabolic acidosis: Prevention and treatment 2. Hyponatraemia: An alternative source of correction in the presence of acidosis. 3. Maintenance of arterial line or central venous line patency
Action	An alkalinising agent. It can be used to increase plasma bicarbonate concentration and correct metabolic acidosis. ⁴ Acetate is metabolised in 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	<p>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.</p> <p>Arterial line or central venous line patency (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. >1.5 kg with metabolic acidosis: sodium acetate standard strength* with heparin 1 unit/mL up to 1 mL/hour. *Half strength and standard strengths are similar in osmolality to sodium chloride 0.45% and 0.9% respectively.</p>
Dose adjustment	No information.
Maximum dose	No information.
Total cumulative dose	No information.
Route	Intravenous, intra-arterial.
Preparation	<p>Intravenous correction for metabolic acidosis</p> <p>20mL Syringe Sodium acetate – Standard strength* Add 1.6 mL of sodium acetate (3.2 mmol) to 18.4 mL of water for injection to make a final volume of 20 mL with a concentration of 0.16 mmol/mL. 1 mmol/kg/day = 0.26 ml/kg/hour</p> <p>Sodium acetate – High strength* (central line preferred) Add 5 mL of sodium acetate (10 mmol) to 15 mL of water for injection to make a final volume of 20 mL with a concentration of 0.5 mmol/mL. 1 mmol/kg/day = 0.08 ml/kg/hour</p> <p>50mL Syringe 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</p> <p>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. 1 mmol/kg/day = 0.08 ml/kg/hour</p> <p>*standard and high strengths are similar in osmolality to sodium chloride 0.9% and 3% respectively.</p>

	<p>Arterial line or central venous line patency (heparin added)</p> <p>20mL Syringe</p> <p>Sodium acetate – Half strength* (for weight <1 Kg): Draw up 0.8 mL of sodium acetate (equivalent to 1.6 mmol of acetate), add 2 mL of Heparinised Saline (20 units), and add to 17.2 mL of water for injection to make a final volume of 20 mL with a concentration of 0.08 mmol/mL of sodium acetate.</p> <p>Sodium acetate – Standard strength* (for weight ≥1 kg): Draw up 1.6 mL of sodium acetate (equivalent to 3.2 mmol of acetate), add 2 mL of Heparinised Saline (20 units), and add to 16.4 mL of water for injection to make a final volume of 20 mL with a concentration of 0.16 mmol/mL of sodium acetate.</p> <p>50mL Syringe</p> <p>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.</p> <p>Sodium acetate – Standard strength* (for weight ≥1 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.</p> <p>*Half strength and standard strengths are similar in osmolality to sodium chloride 0.45% and 0.9% respectively.</p> <p>Sodium and acetate in mmol/kg/day with the above infusions for intra-arterial/central venous line patency:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 15%;">Weight</th> <th style="width: 35%;">Sodium acetate strength</th> <th style="width: 15%;">Rate</th> <th style="width: 35%;">mmol/kg/day</th> </tr> </thead> <tbody> <tr> <td>500 g</td> <td rowspan="3" style="text-align: center;">Half strength</td> <td rowspan="3" style="text-align: center;">0.5 mL/hour</td> <td>1.9 mmol/kg/day</td> </tr> <tr> <td>750 g</td> <td>1.2 mmol/kg/day</td> </tr> <tr> <td>1000 g</td> <td>0.9 mmol/kg/day</td> </tr> <tr> <td>500 g</td> <td rowspan="4" style="text-align: center;">Standard strength</td> <td rowspan="4" style="text-align: center;">0.5 mL/hour</td> <td>3.8 mmol/kg/day</td> </tr> <tr> <td>750 g</td> <td>2.5 mmol/kg/day</td> </tr> <tr> <td>1000 g</td> <td>1.9 mmol/kg/day</td> </tr> <tr> <td>2000 g</td> <td>0.95 mmol/kg/day</td> </tr> </tbody> </table>	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
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Administration	Continuous infusion																						
Monitoring	Electrolytes, acid base status (bicarbonate, base excess, pCO ₂)																						
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, 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, remifentanyl, 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	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Solution</th> <th style="width: 33%;">Electrolyte (mmol/mL)</th> <th style="width: 33%;">Osmolarity (mOsm/L)</th> </tr> </thead> <tbody> <tr> <td>Human Plasma</td> <td></td> <td>280-300</td> </tr> <tr> <td>Sodium acetate 16.4%</td> <td>2 mmol/mL of Na</td> <td>4000</td> </tr> <tr> <td>Sodium chloride 0.45%</td> <td>0.08 mmol/mL of Na</td> <td>154</td> </tr> <tr> <td>Sodium chloride 0.9%</td> <td>0.15 mmol/mL of Na</td> <td>308</td> </tr> <tr> <td>Sodium chloride 3%</td> <td>0.51 mmol/mL of Na</td> <td>1027</td> </tr> <tr> <td>Sodium acetate half strength</td> <td>0.08 mmol/mL of Na and acetate</td> <td>160</td> </tr> <tr> <td>Sodium acetate standard strength</td> <td>0.16 mmol/mL of Na and acetate</td> <td>320</td> </tr> <tr> <td>Sodium acetate high strength</td> <td>0.5 mmol/mL of Na and acetate</td> <td>1000</td> </tr> <tr> <td>Sodium bicarbonate 8.4%</td> <td>1 mmol/mL of Na and bicarbonate</td> <td>2000</td> </tr> <tr> <td>Sodium bicarbonate 4.2%</td> <td>0.5 mmol/mL of Na and bicarbonate</td> <td>1000</td> </tr> </tbody> </table>			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
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Evidence	<p>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.</p> <p>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 PCO₂. 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 pCO₂ 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</p> <p>Pharmacokinetics Following administration acetate is metabolised in liver to bicarbonate.</p>																																			
Practice points																																				
References	<ol style="list-style-type: none"> 1. Sodium acetate injection, USP. Fresenius kabi. Product info. March 2008. http://editor.fresenius-kabi.us/PIs/Sodium_Ace_Inj_45828E_Mar_08.pdf. 2. 0.45% sodium chloride injection, USP. Accessdata.fda.gov. 3. 0.9% sodium chloride injection, USP. Accessdata.fda.gov. 4. DBL Sodium Acetate Concentrated Injection. Accessed via MIMS online on 8 February 2022. [Internet]. 																																			

	<p>5. Sodium acetate. IBM Micromedex. Accessed online on 14 February 2022.</p> <p>6. Sodium acetate. Australian Injectable Drugs Handbook. Accessed online on 14 February 2022.</p> <p>7. Ali A, Ong E-Y, Singh BKS, Cheah F-C. Comparison between sodium acetate and sodium chloride in parenteral nutrition for very preterm infants on the acid-base status and neonatal outcomes. <i>Pediatric Gastroenterology, Hepatology & Nutrition</i>. 2020;23(4):377.</p> <p>8. Ekblad H, Kero P, Takala J. Slow sodium acetate infusion in the correction of metabolic acidosis in premature infants. <i>American journal of diseases of children</i>. 1985;139(7):708-10.</p>
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Authors Contribution of the current version

Original author/s	Srinivas Bolisetty, Pramod Pharande
Evidence Review	Srinivas Bolisetty
Expert review	
Nursing Review	Benjamin Emerson-Parker, Renae Gengaroli
Pharmacy Review	Rebecca O'Grady, Kerrie Knox
ANMF Group contributors	Nilkant Phad, Bhavesh Mehta, Amber Seigel, Rebecca Barzegar, Jutta Van Den Boom, Mohammad Irfan Azeem, Cindy Chen, Thao Tran, Simarjit Kaur, Michelle Jenkins, Susannah Brew, Bryony Malloy, Celia Cunha Da Silva, Dianne Lee, Charles Tian, Trong Tran, Ian Callander, Emma Roylance
Final editing	Srinivas Bolisetty
Electronic version	Helen Huynh, Ian Callander
Facilitator	Srinivas Bolisetty

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