Alert
Most often given in conjunction with calcium for the prevention and treatment of metabolic bone disease in preterm infants.
1 mmol phosphorus/phosphate (P) = 31 mg elemental phosphorus.
1 mmol elemental calcium (Ca) = 40 mg elemental calcium.
Separate oral doses from calcium supplements by at least 1 hour.
When using IV preparation, always check plasma sodium and potassium concentrations to assist in choosing the right phosphate preparation (e.g. sodium or potassium phosphate preparation).

Indication
Treatment of Metabolic Bone Disease.
Treatment of hypophosphataemia.
Supplementation to meet the recommended daily intakes.

Action
Phosphorus is a major intracellular mineral and is important in bone mineralisation and energy production.

Drug Type
Mineral

Trade Name
Phosphate-Sandoz® oral effervescent tablets
Each tablet contains: 16.1 mmol phosphate (equivalent to 500 mg elemental phosphorus); 20.4 mmol sodium; 3.1 mmol potassium
Sodium dihydrogen phosphate Phebra IV (preferred IV preparation)
Each 10 mL vial (sodium dihydrogen phosphate 1.56 g) contains: 10 mmol phosphate; 10 mmol sodium; 20 mmol hydrogen
Potassium dihydrogen phosphate concentrated injection DBL IV
Potassium dihydrogen phosphate concentrated injection Phebra IV
Each 10 mL ampoule (potassium dihydrogen phosphate 1.361 g) contains: 10 mmol phosphate; 10 mmol potassium; 20 mmol hydrogen

Presentation
Oral: 500 mg effervescent tablets; IV preparation (e.g. sodium or potassium dihydrogen phosphate) can be given orally.
IV: Sodium dihydrogen phosphate 10 mL vial; Potassium dihydrogen phosphate concentrated injection 10 mL ampoule.

Dosage/Interval
Treatment of metabolic bone disease (MBD)

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<tr>
<th>Drug Formulation</th>
<th>Dosage/Interval</th>
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| **PO**           | 1 to 3 mmol/kg/day in 2-4 divided doses as an addition to intake from milk and other sources to a maximum intake of 4.5 mmol/kg/day. Use either Sodium dihydrogen phosphate Phebra IV preparation or Phosphate-Sandoz tablets. General principles of treatment of MBD: 
A. Commence at low dose (e.g. 1 mmol/kg/day) and titrate the dose up as tolerated. 
B. Given in conjunction with calcium supplementation (but not together - example: Calcium 8 AM, 2 PM, 8 PM and Phosphorus 6 AM, 12 MD, 6 PM ) 
C. Aim to reach the upper end of the recommended intake: Ca 5 mmol/kg/day and P 4.5 mmol/kg/day. 
D. Dose can be adjusted with a goal of slight excess supply aiming for urinary calcium ≥1.2mmol/L and phosphate ≥0.4 mmol/L. |
| **IV**           | 0.2 mmol/kg/dose [range 0.15–0.33 mmol/kg/dose] over 6 hours. Repeat as necessary. Aim to maintain normophosphataemia of 1.8–2.6 mmol/L (5.6–8.1 mg/dl). |
| **Daily Supplementation to meet the recommended daily intakes (RDI)** |
| Parenteral: | 
| Preterm – First days of life: 1.0-2.0 mmol/kg/day (31-62 mg/kg/day) 
Growing preterm – 1.6-3.5 mmol/kg/day (77-108 mg/kg/day) |
**Phosphorus**

Newborn use only

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<tr>
<th>Term neonates – 0.7-1.3 mmol/kg/day (20-40 mg/kg/day)</th>
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**Enteral:** 2–4.5 mmol/kg/day (62–140 mg/kg/day of phosphorous)\(^7,8\)

1. Calculate intake from parenteral and enteral sources
2. Supplement the difference via IV or oral route.

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<thead>
<tr>
<th><strong>Route</strong></th>
<th><strong>PO</strong></th>
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<tbody>
<tr>
<td><strong>IV</strong></td>
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<tr>
<th><strong>Maximum Daily Dose</strong></th>
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<tr>
<th><strong>Preparation/Dilution</strong></th>
<th><strong>Oral</strong></th>
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<tr>
<td><strong>Option 1</strong> (preferred option for infants going home or when a long storage time is required in the NICU): Disperse 500 mg (16.1 mmol) Phosphate-Sandoz in 16 mL of water for injection to make a solution with a concentration of 1 mmol/mL.</td>
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<td><strong>Option 2</strong> (can be used where preparation with low osmolality is preferred e.g. infants with history of feed intolerance): IV sodium dihydrogen phosphate decanted into a bottle and given orally undiluted (expiry time: 7 days).</td>
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**IV infusion for treatment of acute hypophosphatemia:**

- **IV infusion (sodium dihydrogen phosphate):** Draw up 1 mL (1 mmol phosphate) and add 19 mL sodium chloride 0.9% or glucose 5% to make a final volume of 20 mL with a concentration of 0.05 mmol/mL. Draw up 3 mL/kg (0.15 mmol/kg).

- **IV infusion (potassium dihydrogen phosphate):** Draw up 1 mL (1 mmol phosphate) and add 24 mL sodium chloride 0.9% or glucose 5% to make a final volume of 25 mL with a concentration of 0.04 mmol/mL. Draw up 3.75 mL/kg (0.15 mmol/kg).

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<tr>
<th><strong>Administration</strong></th>
<th><strong>Oral</strong></th>
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<tr>
<td>Can be administered with feeds (refer to evidence summary section). Separate calcium supplements by at least 2 hours.</td>
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<tr>
<td><strong>IV</strong></td>
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<td>As part of parenteral nutrition fluid – refer to individual parenteral nutrition formulations.</td>
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**IV infusion for treatment of acute hypophosphatemia:**

- IV sodium dihydrogen phosphate or IV potassium dihydrogen phosphate: Infuse over at least 6 hours. For severe hypophosphatemia infuse over 8–12 hours. Maximum infusion rate of 0.2 mmol/kg/h.

| **Monitoring** | Phosphate, calcium, magnesium, alkaline phosphatase concentrations are required at least fortnightly or more often if required. Once these concentrations normalise, serum analysis may be performed once monthly for 6 months or at the discretion of the clinician.\(^10\) Urinary calcium and phosphate and Tubular Reabsorption Phosphate (TRP)\(^%\), parathormone, and vitamin D concentrations may be useful under certain circumstances. |

| **Contraindications** | Hyperphosphataemia, dehydration, severe renal insufficiency, shock. |

| **Precautions** | Hypernatraemia (avoid sodium dihydrogen phosphate). Hyperkalaemia (avoid potassium dihydrogen phosphate) |

| **Drug Interactions** | Calcium and magnesium antacids (e.g. acetate, carbonate, citrate, hydroxide etc.) reduce phosphate absorption — separate doses by at least 2 hours. Additive effects with other drugs that may prolong QT interval. Potassium dihydrogen phosphate preparation may increase the risk of hyperkalaemia when used in conjunction with potassium sparing diuretics (e.g. spironolactone). |

| **Adverse Reactions** | Diarrhoea (oral use only), hypocalcaemia, nephrotoxicity, prolonged QT interval, hypotension, hypomagnesaemia. Hyperphosphataemia – carpopedal spasm, seizures.\(^2\) |

| **Compatibility** | Potassium dihydrogen phosphate |
Compatible fluids: Glucose 5%, glucose 10%, glucose in Hartmann’s solution, glucose in Ringer’s solution, glucose in sodium chloride solutions, Hartmann’s, Ringer’s, sodium chloride 0.45%, sodium chloride 0.9%, sodium chloride 3%. Compatible via Y-site : No information.

Sodium dihydrogen phosphate
Compatible fluids: Glucose 5%, sodium chloride 0.9%. Compatible via Y-site : No information

Incompatibility
Potassium dihydrogen phosphate
Fluids: No information
Drugs: Aciclovir, amiodarone, anidulafungin, calcium folinate, calcium salts, caspofungin, ceftraroline, fosamil, ciprofloxacin, dolasetron, doripenem, ketamine, lorazepam, magnesium salts, mycophenolate, mofetil, rocuronium. Solutions that contain other cations such as calcium, magnesium, iron and aluminium may also precipitate.

Sodium dihydrogen phosphate
Fluids : No information
Drugs: Aciclovir, amiodarone, anidulafungin, calcium folinate, calcium salts, caspofungin, ceftraroline, fosamil, ciprofloxacin, dolasetron, mycophenolate, mofetil. Calcium, aluminium or magnesium containing solutions.

Stability
Preparation from oral effervescent tablets: It is to be used immediately after preparation and discard unused portion.
Oral preparation from IV sodium dihydrogen phosphate: 7 days

Storage
Store below 25°C.

Special Comments
Refer to full version.

Evidence summary
Refer to full version.

References
Refer to full version.