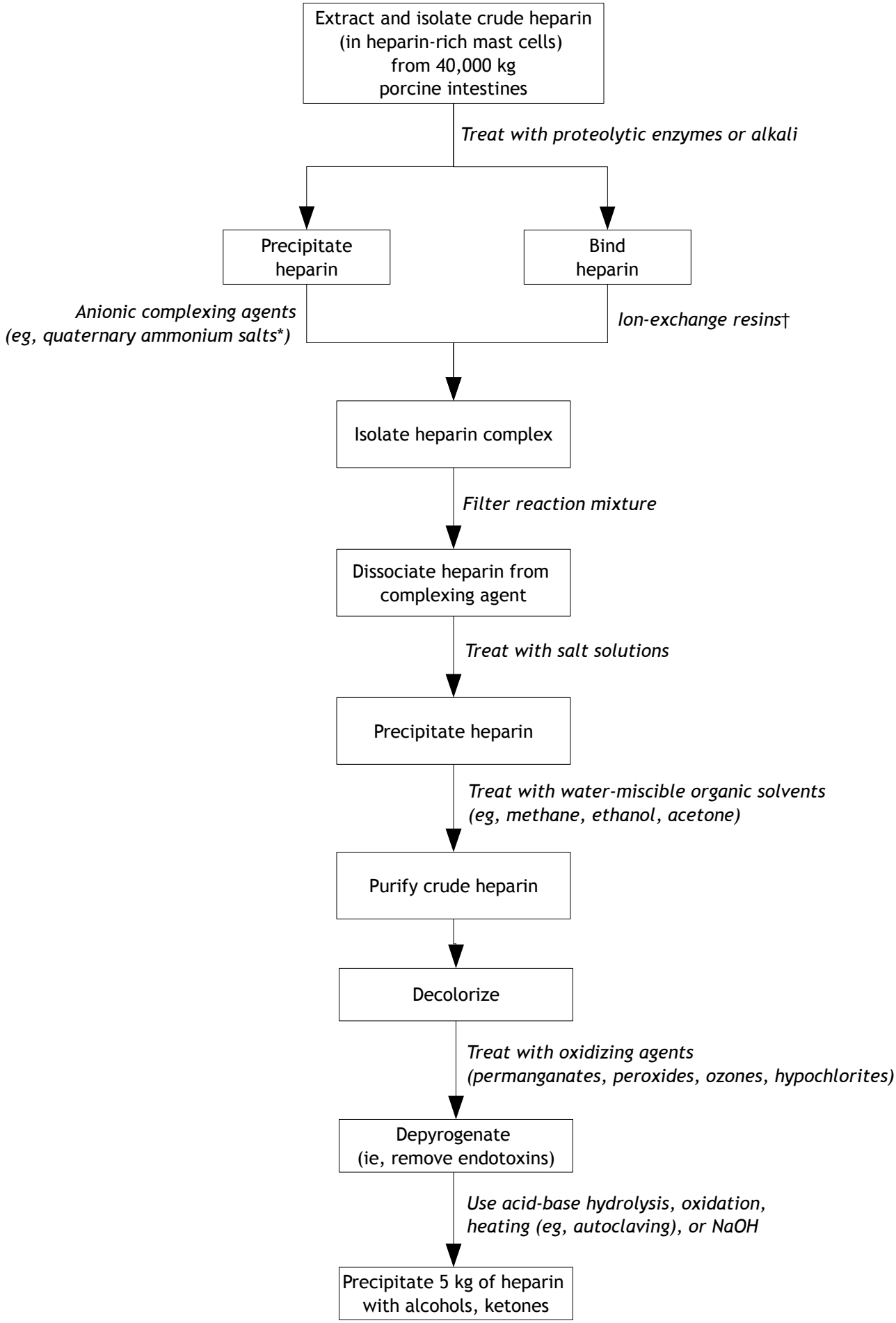
Extract and isolate crude heparin (in heparin-rich mast cells) from 40,000 kg porcine intestines
Treat with proteolytic enzymes or alkali
Precipitate heparin
Bind heparin
Anionic complexing agents (eg, quaternary ammonium salts*)
Ion-exchange resins†
Isolate heparin complex
Filter reaction mixture
Dissociate heparin from complexing agent
Treat with salt solutions
Precipitate heparin
Treat with water-miscible organic solvents (eg, methane, ethanol, acetone)
Purify crude heparin
Decolorize
Treat with oxidizing agents (permanganates, peroxides, ozones, hypochlorites)
Depyrogenate (ie, remove endotoxins)
Use acid-base hydrolysis, oxidation, heating (eg, autoclaving), or NaOH
Precipitate 5 kg of heparin with alcohols, ketones