

# CellReactions

CHEM-REACTIONS R-Glycolysis---Step-1(Glucose, ATP ==> Glucose-6-phosphate, ADP | Hexokinase)

CHEM-REACTIONS R-Glycolysis---Step-2(Glucose-6-phosphate ==> Fructose-6-phosphate | Phosphoglucose isomerase)

CHEM-REACTIONS R-Glycolysis---Step-3(Fructose-6-phosphate, ATP ==> Fructose-1,6-bisphosphate, ADP | Phosphofructokinase-1)

CHEM-REACTIONS R-Glycolysis---Step-4(Fructose-1,6-bisphosphate ==> Dihydroxyacetone phosphate, Glyceraldehyde-3-phosphate | Aldolase)

CHEM-REACTIONS R-Glycolysis---Step-5(Dihydroxyacetone phosphate ==> Glyceraldehyde-3-phosphate | Triosephosphate isomerase)

CHEM-REACTIONS R-Glycolysis---Step-6(Glyceraldehyde-3-phosphate, NAD+ ==> 1,3-Bisphosphoglycerate, NADH, H+ | Glyceraldehyde 3-phosphate dehydrogenase)

CHEM-REACTIONS R-Glycolysis---Step-7(1,3-Bisphosphoglycerate, ADP ==> 3-Phosphoglycerate, ATP | Phosphoglycerate kinase)

CHEM-REACTIONS R-Glycolysis---Step-8(3-Phosphoglycerate ==> 2-Phosphoglycerate | Phosphoglycerate mutase)

CHEM-REACTIONS R-Glycolysis---Step-9(2-Phosphoglycerate ==> Phosphoenolpyruvate, H2O | Enolase)

CHEM-REACTIONS R-Glycolysis---Step-10(Phosphoenolpyruvate, ADP ==> Pyruvate, ATP | Pyruvate kinase)

CHEM-REACTIONS R-Citric-Acid-Cycle---Step-1(Acetyl-CoA, Oxaloacetate ==> Citrate, CoA-SH | Citrate synthase)

CHEM-REACTIONS R-Citric-Acid-Cycle---Step-2(Citrate ==> Isocitrate | Aconitase)

CHEM-REACTIONS R-Citric-Acid-Cycle---Step-3(Isocitrate, NAD+ ==> α-Ketoglutarate, CO2, NADH | Isocitrate dehydrogenase)

CHEM-REACTIONS R-Citric-Acid-Cycle---Step-4(α-Ketoglutarate, NAD+, CoA-SH ==> Succinyl-CoA, CO2, NADH | α-Ketoglutarate dehydrogenase)

CHEM-REACTIONS R-Citric-Acid-Cycle---Step-5(Succinyl-CoA, GDP ==> Succinate, CoA-SH, GTP | Succinyl-CoA synthetase)

CHEM-REACTIONS R-Citric-Acid-Cycle---Step-6(Succinate, FAD ==> Fumarate, FADH2 | Succinate dehydrogenase)

CHEM-REACTIONS R-Citric-Acid-Cycle---Step-7(Fumarate, H2O ==> Malate | Fumarase)

CHEM-REACTIONS R-Citric-Acid-Cycle---Step-8(Malate, NAD+ ==> Oxaloacetate, NADH | Malate dehydrogenase)

CHEM-REACTIONS R-Photosynthesis---Light-Reaction(H2O, NADP+, ADP, Pi ==> O2, NADPH, ATP | Photosystem II, Photosystem I)

CHEM-REACTIONS R-Photosynthesis---Calvin-Cycle(CO2, ATP, NADPH ==> Glyceraldehyde-3-phosphate, ADP, Pi, NADP+ | Ribulose-1,5-bisphosphate carboxylase/oxygenase)

CHEM-REACTIONS R-Pentose-Phosphate-Pathway---Oxidative-Phase(Glucose-6-phosphate, NADP+ ==> Ribulose-5-phosphate, NADPH, CO2 | Glucose-6-phosphate dehydrogenase)

CHEM-REACTIONS R-Pentose-Phosphate-Pathway---Non-oxidative-Phase(Ribulose-5-phosphate ==> Fructose-6-phosphate, Glyceraldehyde-3-phosphate | Transketolase, Transaldolase)

CHEM-REACTIONS R-Urea-Cycle---Step-1(NH4+, HCO3-, ATP ==> Carbamoyl phosphate, ADP, Pi | Carbamoyl phosphate synthetase I)

CHEM-REACTIONS R-Urea-Cycle---Step-2(Carbamoyl phosphate, Ornithine ==> Citrulline, Pi | Ornithine transcarbamylase)

CHEM-REACTIONS R-Urea-Cycle---Step-3(Citrulline, Aspartate, ATP ==> Argininosuccinate, AMP, PPi | Argininosuccinate synthetase)

CHEM-REACTIONS R-Urea-Cycle---Step-4(Argininosuccinate ==> Arginine, Fumarate | Argininosuccinate lyase)

CHEM-REACTIONS R-Urea-Cycle---Step-5(Arginine, H2O ==> Urea, Ornithine | Arginase)

CHEM-REACTIONS R-Fatty-Acid-Synthesis---Step-1(Acetyl-CoA, HCO3-, ATP ==> Malonyl-CoA, ADP, Pi | Acetyl-CoA carboxylase)

CHEM-REACTIONS R-Fatty-Acid-Synthesis---Step-2(Malonyl-CoA, Acetyl-ACP ==> Acetoacetyl-ACP, CO2, ACP | Fatty acid synthase)

CHEM-REACTIONS R-Fatty-Acid-Synthesis---Step-3(Acetoacetyl-ACP, NADPH ==> D-3-Hydroxybutyryl-ACP, NADP+ | β-Ketoacyl-ACP reductase)

CHEM-REACTIONS R-Fatty-Acid-Synthesis---Step-4(D-3-Hydroxybutyryl-ACP ==> Crotonyl-ACP, H2O | β-Hydroxyacyl-ACP dehydratase)

CHEM-REACTIONS R-Fatty-Acid-Synthesis---Step-5(Crotonyl-ACP, NADPH ==> Butyryl-ACP, NADP+ | Enoyl-ACP reductase)

CHEM-REACTIONS R-Fatty-Acid-Synthesis---Step-6(Butyryl-ACP, Malonyl-CoA ==> Hexanoyl-ACP, CO2, ACP | Fatty acid synthase)

CHEM-REACTIONS R-Fatty-Acid-Synthesis---Step-7(Hexanoyl-ACP, Malonyl-CoA ==> Octanoyl-ACP, CO2, ACP | Fatty acid synthase)

CHEM-REACTIONS R-Fatty-Acid-Synthesis---Step-8(Octanoyl-ACP, Malonyl-CoA ==> Decanoyl-ACP, CO2, ACP | Fatty acid synthase)

CHEM-REACTIONS R-Fatty-Acid-Synthesis---Step-9(Decanoyl-ACP, Malonyl-CoA ==> Dodecanoyl-ACP, CO2, ACP | Fatty acid synthase)

CHEM-REACTIONS R-Fatty-Acid-Synthesis---Step-10(Dodecanoyl-ACP, Malonyl-CoA ==> Tetradecanoyl-ACP, CO2, ACP | Fatty acid synthase)

CHEM-REACTIONS R-Fatty-Acid-Synthesis---Step-11(Tetradecanoyl-ACP, Malonyl-CoA ==> Hexadecanoyl-ACP, CO2, ACP | Fatty acid synthase)

CHEM-REACTIONS R-Fatty-Acid-Synthesis---Step-12(Hexadecanoyl-ACP, Malonyl-CoA ==> Octadecanoyl-ACP, CO2, ACP | Fatty acid synthase)

CHEM-REACTIONS R-Fatty-Acid-Synthesis---Step-13(Octadecanoyl-ACP, H2O ==> Stearic acid, ACP | Thioesterase)

CHEM-REACTIONS R-Beta-Oxidation---Step-1(Palmitoyl-CoA, FAD ==> Trans-Δ2-enoyl-CoA, FADH2 | Acyl-CoA dehydrogenase)

CHEM-REACTIONS R-Beta-Oxidation---Step-2(Trans-Δ2-enoyl-CoA, H2O ==> L-3-Hydroxyacyl-CoA | Enoyl-CoA hydratase)

CHEM-REACTIONS R-Beta-Oxidation---Step-3(L-3-Hydroxyacyl-CoA, NAD+ ==> 3-Ketoacyl-CoA, NADH, H+ | L-3-Hydroxyacyl-CoA dehydrogenase)

CHEM-REACTIONS R-Beta-Oxidation---Step-4(3-Ketoacyl-CoA, CoA-SH ==> Acetyl-CoA, Acyl-CoA | Beta-ketothiolase)

CHEM-REACTIONS R-Gluconeogenesis---Step-1(Pyruvate, HCO3-, ATP ==> Oxaloacetate, ADP, Pi | Pyruvate carboxylase)

CHEM-REACTIONS R-Gluconeogenesis---Step-2(Oxaloacetate, GTP ==> Phosphoenolpyruvate, GDP, CO2 | Phosphoenolpyruvate carboxykinase)

CHEM-REACTIONS R-Gluconeogenesis---Step-3(Phosphoenolpyruvate, H2O ==> 2-Phosphoglycerate | Enolase)

CHEM-REACTIONS R-Gluconeogenesis---Step-4(2-Phosphoglycerate ==> 3-Phosphoglycerate | Phosphoglycerate mutase)

CHEM-REACTIONS R-Gluconeogenesis---Step-5(3-Phosphoglycerate, ATP ==> 1,3-Bisphosphoglycerate, ADP | Phosphoglycerate kinase)

CHEM-REACTIONS R-Gluconeogenesis---Step-6(1,3-Bisphosphoglycerate, NADH ==> Glyceraldehyde-3-phosphate, NAD+, Pi | Glyceraldehyde-3-phosphate dehydrogenase)

CHEM-REACTIONS R-Gluconeogenesis---Step-7(Glyceraldehyde-3-phosphate ==> Dihydroxyacetone phosphate | Triosephosphate isomerase)

CHEM-REACTIONS R-Gluconeogenesis---Step-8(Dihydroxyacetone phosphate ==> Fructose-1,6-bisphosphate | Aldolase)

CHEM-REACTIONS R-Gluconeogenesis---Step-9(Fructose-1,6-bisphosphate, H2O ==> Fructose-6-phosphate, Pi | Fructose-1,6-bisphosphatase)

CHEM-REACTIONS R-Gluconeogenesis---Step-10(Fructose-6-phosphate ==> Glucose-6-phosphate | Phosphoglucose isomerase)

CHEM-REACTIONS R-Gluconeogenesis---Step-11(Glucose-6-phosphate, H2O ==> Glucose, Pi | Glucose-6-phosphatase)

CHEM-REACTIONS R-Cholesterol-Synthesis---Step-1(Acetyl-CoA ==> Acetoacetyl-CoA | Acetyl-CoA acetyltransferase)

CHEM-REACTIONS R-Cholesterol-Synthesis---Step-2(Acetoacetyl-CoA, Acetyl-CoA ==> HMG-CoA | HMG-CoA synthase)

CHEM-REACTIONS R-Cholesterol-Synthesis---Step-3(HMG-CoA, NADPH ==> Mevalonate, CoA-SH, NADP+ | HMG-CoA reductase)

CHEM-REACTIONS R-Cholesterol-Synthesis---Step-4(Mevalonate, ATP ==> Mevalonate-5-phosphate, ADP | Mevalonate kinase)

CHEM-REACTIONS R-Cholesterol-Synthesis---Step-5(Mevalonate-5-phosphate, ATP ==> Mevalonate-5-diphosphate, ADP | Phosphomevalonate kinase)

CHEM-REACTIONS R-Cholesterol-Synthesis---Step-6(Mevalonate-5-diphosphate, ATP ==> Isopentenyl pyrophosphate, ADP, CO2 | Mevalonate-5-diphosphate decarboxylase)

CHEM-REACTIONS R-Cholesterol-Synthesis---Step-7(Isopentenyl pyrophosphate ==> Dimethylallyl pyrophosphate | Isopentenyl-diphosphate delta-isomerase)

CHEM-REACTIONS R-Cholesterol-Synthesis---Step-8(Isopentenyl pyrophosphate, Dimethylallyl pyrophosphate ==> Geranyl pyrophosphate | Geranyl diphosphate synthase)

CHEM-REACTIONS R-Cholesterol-Synthesis---Step-9(Geranyl pyrophosphate, Isopentenyl pyrophosphate ==> Farnesyl pyrophosphate | Farnesyl diphosphate synthase)

CHEM-REACTIONS R-Cholesterol-Synthesis---Step-10(Farnesyl pyrophosphate, NADPH ==> Squalene, NADP+, PPi | Squalene synthase)

CHEM-REACTIONS R-Cholesterol-Synthesis---Step-11(Squalene, O2, NADPH ==> Squalene epoxide, NADP+ | Squalene monooxygenase)

CHEM-REACTIONS R-Cholesterol-Synthesis---Step-12(Squalene epoxide ==> Lanosterol | Lanosterol synthase)

CHEM-REACTIONS R-Cholesterol-Synthesis---Step-13(Lanosterol ==> Cholesterol | CYP51A1)