1. How should I model the gills compartment? Vidal considers that the blood inflow of the compartment is just a part of the Q\_total.
2. Excretion pathways (gills, urine, feces)
   * 1. Urinary excretion.  
        In general the reabsorption of PFAS from urine back to organism is a possible process in fish. We can consider a ratio of Renal elimination to reabsorption (K\_renal) specific for each PFAS substance. The values of K\_renal can be given from Ng et al., (2013) who has estimated both renal elimination and reabsorption rate. Using these ratios makes it easier to fit a Cl\_urine (urinary elimination rate) and then calculate reabsorption rate of pfas. Also, the K\_renal ratio seems to decrease with the increase of chain length of PFAS. (Sun et al. 2022 also approached it this way).   
          
        Ng et al., 2013  
        A picture containing text, font, screenshot, number

        Description automatically generated  
          
        Sun et al., 2022  
        A screenshot of a calculator

        Description automatically generated with low confidence

For the modeling of these processes, we will need a flow rate of urine and the volume of urine existing in the gallbladder of rainbow trout. We can take these values from Curtis et al., 1981. To calculate V\_urine we use the mean maximum volume of the urinary bladder which is 2.20 ml/kg. To calculate Q\_urine we use the mean of urinary flow rates given in Table 2, so

(kg)

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1. Vidal and Grech, based on Nichols, considers that a big part of outflow from muscle and skin compartments goes to kidney compartment.
2. About Enterohepatic circulation

* Cao et al.2022 supports that PFAS are recirculated via the reabsorption from bile back to blood. They estimated the F\_reab parameters for various PFAS substances.

Table

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* Martin et al., 2013 (dietary) supports that enterohepatic circulation plays important role in fish.
* Rainbow trout Bile flow rate = 75 μL/kg/h by Grosell et al., 2000 (<https://doi.org/10.1152/ajpregu.2000.278.6.R1674>)

1. In the paper of Falk et al.2015 it seems that the blood concentrations are calculated considering the whole blood volume, not only the plasma volume.
2. “*PFOA and PFOS are >90% bound to plasma proteins such as albumin in the rat, monkey, and human [35–38]. Because PFAAs are so highly bound in plasma, this will affect distribution and partitioning into tissues, and the free fraction of chemical must be accounted for in the model.*” (Loccisano et al., 2012)
3. About the ratio of plasma to total blood volume. This ratio seems to be around 70% (plasma volume/total blood volume) in fish and specifically in rainbow trout.
   1. Stevens et al., (1968): The hematocrit seems to be between 25% and 30% (so the plasma is between 70% and 75%) – Table 1.  
      A picture containing text, font, number, screenshot

      Description automatically generated
   2. Brill et al., (1998): Reported that the hematocrit is the 30% of the total blood volume – Table 1.  
        
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   3. Gingerich et al., (1990): Measured the plasma volume per 100 g of fish for two rainbow trout strains. The two plasma/total blood ratios are 3.74/5.27=0.70 and 3.24/4.63=0.70 – Table 2.  
      A picture containing text, font, screenshot, white

      Description automatically generated
4. Assimilation efficiencies were given by Goeritz et al. 2013  
   A picture containing text, screenshot, number, font

   Description automatically generated
   1. The values for the Free parameter are taken by Sun et al., 2022  
      A picture containing text, screenshot, font, parallel

      Description automatically generated